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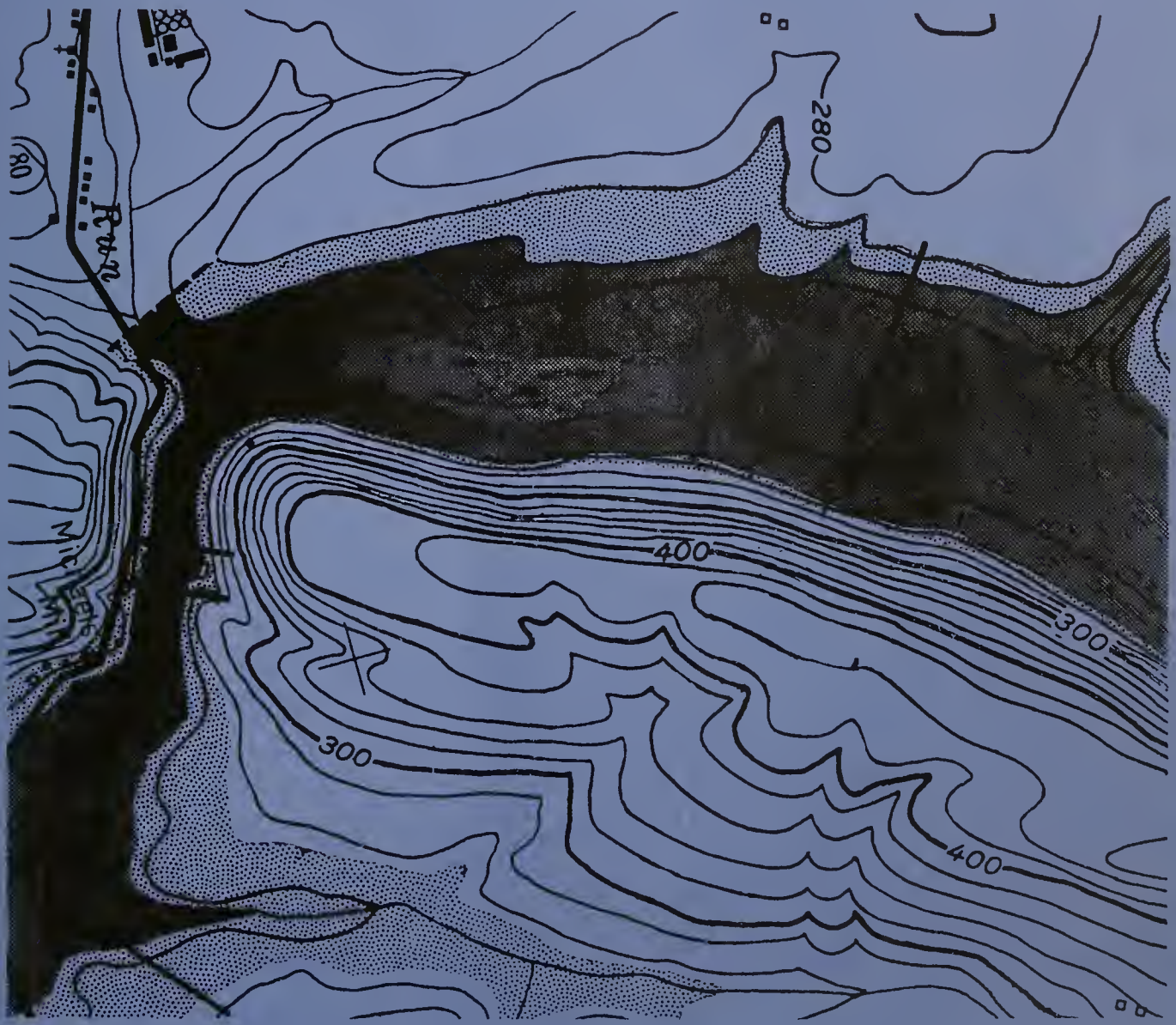
# SUMMARY OF FLOOD RELATED STUDIES IN MARYLAND




MARYLAND DEPARTMENT OF STATE PLANNING

JULY 1973

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MARYLAND DEPARTMENT OF STATE PLANNING
STATE OFFICE BUILDING
BALTIMORE, MARYLAND 21201

Publication No. 194

July 1973

STATE OF MARYLAND

MARVIN MANDEL, GOVERNOR

# DEPARTMENT OF STATE PLANNING

Maryland. Publication

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MARVIN MANDEL
GOVERNOR

VLADIMIR A. WAHBE
SECRETARY OF STATE PLANNING
EDWIN L. POWELL, JR.
DEPUTY SECRETARY

July 31, 1973

The Honorable Marvin Mandel
Governor of Maryland
The State House
Annapolis, Maryland 21404

Dear Governor Mandel:

On September 8, 1972, you designated the Department of State Planning to coordinate Hurricane Agnes recovery planning in the State of Maryland. In response to this, the Flood Disaster Coordination Office was established and is now in the process of compiling information and coordinating flood recovery planning activities.

Therefore, I am pleased to transmit the enclosed report entitled, Summary of Flood Related Studies in Maryland. This is the first of several reports which will be prepared by the Flood Disaster Coordination Office.

This report describes the background and activities of Federal and State agencies sufficiently to direct individuals, organizations, agencies and departments, both public and private, to available resources in dealing with specific problems regarding flood prevention activities. At the same time, it serves as a discovery document which will hopefully enable flood prevention activities to continue in a more coordinated manner.

Sincerely,

Vladimir Wahbe

VW:ph

Enclosure

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## PREFACE

The discussion and compilation of studies and investigations of flooding problems represents a first effort in coordinating flood disaster recovery, rehabilitation and prevention planning activities in Maryland. After extensive discussions with Federal, State and local agencies concerned with flooding problems, it appeared that the necessary first step was to find out who was doing what.

This report was prepared to serve the three levels (Federal, State and local) of the planning community. The report describes the background and activities of Federal and State agencies in sufficient detail to direct the reader to available resources in dealing with specific problems regarding flood prevention planning. At the same time, the report serves as a discovery document which hopefully will enable flood prevention activities to continue in a more coordinated manner.

Acknowledgement is due to the cooperative assistance provided by the Federal and State agencies discussed herein.

Donald E. Brand, Planner
Flood Disaster Coordination Office

# I. INTRODUCTION

During the period of June 14 to 23, 1972, Hurricane Agnes swept across the eastern coast of the United States from North Carolina to New York State causing severe damage and loss of life. Baltimore City and 22 of 23 Maryland counties were declared Federal disaster areas, thus becoming eligible for Federal emergency disaster assistance.

To implement this assistance, a joint "Statement of Agreement" was executed by Marvin Mandel, Governor of Maryland, and Thomas M. Phelan, Federal Regional Council (FRC) Coordinator for Maryland. The FRC is composed of regional directors of Federal agencies and is responsible for coordinating requests and disbursement of Federal funds. The agreement provided that:

1. The Maryland Department of State Planning would coordinate all of the State and local flood planning efforts. (The Flood Disaster Coordination Office (FDCO) was established to carry out this assignment);

2. The Federal Regional Council would establish an office in Baltimore to coordinate the Federal response; and

3. The FRC would, through its individual members, provide planning aid and technical assistance to Maryland in its long-range planning and rehabilitation effort.

Planning assistance of $500,000 was allocated to the State for the long-range planning effort. FDCO's responsibilities include the administration of the funded flood recovery planning and prevention programs within various State and local agencies and other activities as set forth in the following FDCO program objectives:

1. Promote and assist in a process utilizing existing governmental organizations to effectively deal with flood problems.

2. Encourage and develop an efficient system for the collection, evaluation, coordination and dissemination of flood recovery, rehabilitation and prevention information.

3. Encourage and direct Federal policies and programs to optimize their effectiveness in light of Maryland's needs.

4. Redirect and help flood prevention planning efforts at all levels.

This report is an important contribution in satisfying these objectives.

Changing land uses resulting from the demands for housing, employment, shopping and recreational facilities have had far reaching effects on watershed characteristics. These characteristics determine the flow conditions and geometric patterns of rivers and streams. In an effort to minimize the adverse effects of the changing characteristics, numerous approaches have been employed. The techniques can be placed into one of two basic categories: (1) Those that are related to the rivers and streams and are primarily protective in nature; and (2) those that are more concerned with the adjacent floodplains and are more preventive in intent. The former, due to their large scale, have been most noticeable. They include, for example, the construction of reservoirs, dredging and widening of stream channels, and the building of levees. The U. S. Army Corps of Engineers and the Soil Conservation Service have been actively involved in many of these flood protective efforts.

Increasingly, it has been recognized that flood protective measures must be supplemented by flood preventive techniques. This recognition is due in part to the excessive cost often associated with flood

control projects and the awareness that such projects are not keeping pace with expanding development and other factors contributing to rising flood damages. As a result, more attention is being focused on the land lying adjacent to the rivers and streams, and the increase in impervious areas due to development throughout the contributing watershed.

The Federal Government has taken steps to encourage communities to adopt and enforce land use controls and other floodplain management practices. For example, the Federal Flood Insurance program requires that local governments applying for coverage adopt measures to guide development so that flood damage is avoided or reduced.

Programs have been instituted in many parts of the State to delineate flood hazard areas along waterways in urbanizing areas, or areas where intensive development is anticipated. Floodplain information and flood control studies are being made by the Corps of Engineers at the request of local governments. The U. S. Geological Survey has recently completed a delineation of flood-prone areas to aid planners and administrators in guiding development away from these areas. The Soil Conservation Service is conducting flood control studies and cooperating with the State Department of Natural Resources in completing flood hazard and storm drainage studies. The Department of Housing and Urban Development is contracting with Federal agencies to complete flood insurance studies. The above activities and their relationship to flooding problems in Maryland are discussed in this report along with maps showing the approximate locations of the areas under study.

## II. SUMMARY OF FINDINGS

In the process of compiling flood related studies and investigations, some of the conflicts and conformities of government activities in the area of floodplain management and flood protection planning became evident.

Discussions with the planning departments of most jurisdictions revealed that few had adequate measures to regulate development out of the floodplains. When asked if the subdivision review process considered flood-prone areas, most answered affirmatively. However, many had not been informed of the details of ongoing or completed studies within their jurisdiction. Discussions with state officials also revealed little knowledge of flood related studies in Maryland even when portions of these studies were undertaken within their own department. This shows a definite need for the dissemination of this information to local planners, public works engineers, health officials, developers and the general public.

Flood prone area maps were originally prepared by the U. S. Geological Survey to show administrators, planners and engineers concerned with future land development those areas subject to flooding. Although more detailed information may be required (for formulating zoning regulations, for economic studies, or for setting design criteria) to minimize future flood losses, the information shown on flood-prone area maps can be useful in the preparation of development plans, in zoning matters and review of subdivision plats and building applications

as a general guide to see that floodway encroachment does not take place. Also, the Department of State Planning has recently produced maps of natural soil groups which show the location of alluvial soils in Maryland at a scale of 1"=mile. Other information is also available and discussed in this report.

Local officials fear that the preparation and subsequent enforcement of floodplain regulations based on general studies or delineations such as flood-prone areas defined by the U. S. Geological Survey will not survive a court challenge as to their reliability. The State's right to regulate encroachment of the fifty-year floodplain was upheld in a recent case, "Department of Water Resources vs. A. H. Smith Sand and Gravel Company," Prince George's County Circuit Court, April, 1973. The court suggested that the State may prohibit floodplain encroachment without detailed studies being made. This opinion and other related cases should be studied so that clarification can be made to local jurisdictions regarding restrictions of floodplain development.

The original National Flood Insurance Program under the Department of Housing and Urban Development was created to curb the continually increasing annual losses from flood damage. The Program provides for insurance of structures already existing in floodplains, at affordable rates, with up to 90% of the premium paid by the Federal Government. New construction must pay full actuarial rates which in many cases are prohibitively expensive. The Program now in effect is good in concept, but is defective in a very important area. Individuals and communities have not been participating in restricting development and

related construction. Their desire to develop floodplains and their ability to get disaster relief appears to outweigh any motivation they might have to purchase insurance. A bill has recently been introduced to Congress that would cure this defect. The bill, House Resolution 6524, would allow no Federal financial assistance or assistance from any federally supervised lending institution for acquisition or construction in a designated flood-prone area unless the community and individuals applying for assistance are participating in the program. Proposed amendments to the bill would place a priority on the creation of conservation zones in the floodplain to avoid any increase in structural flood control measures the Program might encourage. The State must take note of this response by Congress to control and internalize the risk of floodplain development.

The Flood Insurance Administration (FIA) has been slow in preparing preliminary flood hazard boundary maps to aid local jurisdictions in qualifying under the regular insurance program. It is evident that more detailed studies are necessary so that actuarial rates (these rates relate the statistical possibility of flood frequency to the resulting damage) can be set and eligibility status changed from the emergency to the regular program. The Corps of Engineers and Soil Conservation Service (SCS) have performed detailed actuarial studies in Maryland for the FIA. The Corps and SCS are well occupied with existing and authorized flood related studies.

However, the data resulting from these studies can be used as a basis for preparing actuarial rate studies for the FIA. But flood

related studies are done by watershed, not by incorporated entities. Priority should be given to those areas which add to study areas already completed or near completion. The FIA would then be in a better position to contract for actuarial rate studies for entire jurisdictions. This is being done in Prince George's County where the Corps of Engineers is doing a rate study in the last remaining area, the Patuxent River Watershed. The FIA had, by mistake, set actuarial rates before the entire county was completed. This shows the need for a stronger role by the State in coordinating these studies.

Most of the watersheds in Maryland which have serious flooding problems have been identified and are in some phase of study by Federal, State or local agencies. Small watersheds have been studied by local agencies in some cases. The lower watersheds of the Big and Little Gunpowder Falls in Baltimore County and the Bynum Run and Winters Run Watersheds in Harford County have experienced significant flooding problems, but have had no studies requested. Other such areas within the State probably exist.

Almost all activities in the State with regard to flood prevention planning have disregarded coastal and bay zone management with regard to hurricane floodings. A survey was made by the Corps of Engineers in 1963. At that time no further planning or investigations for provisions of hurricane protective work were recommended. This study indicated that the entire shoreline is vulnerable to damage from abnormal tides and wave action from severe storms. In light of the recent completion of the parallel Chesapeake Bay Bridge and increasing development on the Eastern Shore, it is suggested that this survey be re-studied.

The lack of coordination and resulting duplication of effort was evident. There are 16 areas under study within the State which are either completed, under study or authorized by more than one agency. This has been recognized by the agencies involved and active steps are being taken to avoid duplication in the future. However, it is clear that a more active role must be taken in setting priorities for all flood related studies not only with regard to the specific type of study proposed, but also with regard to the overall needs of the State.

## III. AGENCIES CONDUCTING STUDIES AND INVESTIGATIONS OF FLOODING PROBLEMS IN MARYLAND

### A. Federal Insurance Administration, U. S. Department of Housing and Urban Development

Flood insurance coverage is available to eligible communities in the form of federally subsidized flood insurance under the National Flood Insurance Program administered by the Federal Insurance Administration (FIA) of the U. S. Department of Housing and Urban Development.

This program was established by the National Flood Insurance Act of 1968 (enacted as part of the Housing and Urban Development Act of 1968) to make specified amounts of flood insurance, previously unavailable from private insurers available under Federal auspices. In return for the provision of subsidized insurance to existing properties, the Act requires that State and local governments adopt and enforce land use and control measures that will guide land development in flood-prone areas in order to avoid or reduce future flood damage.

Authority under the Act has been delegated to the Federal Insurance Administrator in the U. S. Department of Housing and Urban Development (451 7th Street, S. W., Washington, D. C. 20410). The program is a cooperative effort between the Federal Government and the private insurance industry. An association of private insurance companies was formed specifically to provide flood insurance under the cooperative Government-private industry program. This Association appoints a servicing company, generally on a statewide basis, to disseminate information both to the public and to insurance agents, to process all

insurance policies, and to handle the adjustment of claims for loss payments. In the State of Maryland, the service company is the U. S. Fidelity and Guaranty Company.

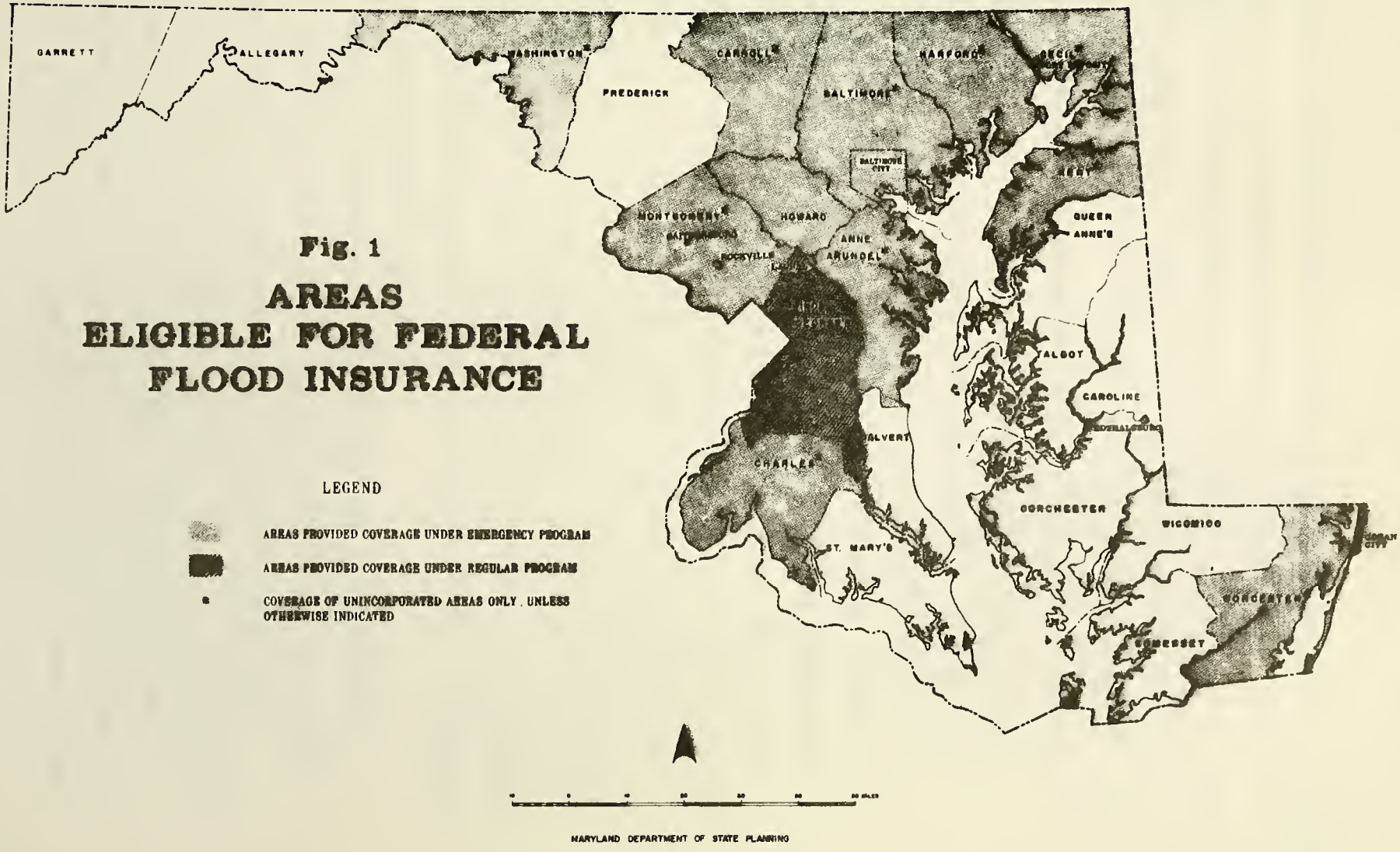
The FIA has been authorized to provide emergency subsidized flood insurance until December 31, 1973, without first determining the individual community's actuarial premium rates, which is a prerequisite for coverage under the regular program. Eligibility under the emergency program is available as an interim step to provide earlier coverage for potential flood victims pending the completion of detailed studies which show the hazard area upon which final rates are set. The FIA has no authority under the emergency program either to offer higher limits of coverage under the regular program or to offer subsidized premium rates to new construction. New construction cannot be covered under the emergency program but must wait until actuarial premium rates have been established. A community must first adopt adequate land use and control measures in order to participate in both emergency and regular flood insurance programs.

When a community becomes eligible, notice is published in the Federal Register, and officials of the community are advised by letter of the date that the sale of insurance will commence. Press releases are provided to local papers and radio and television stations. Local insurance agents and brokers are informed individually of the availability of coverage by FIA. There are nineteen areas in the State which are eligible for insurance. Initially, these areas will only be eligible for coverage under the "emergency program". Areas provided emergency coverage are the unincorporated areas of Anne Arundel,

Baltimore, Carroll, Charles, Cecil, Harford, Howard, Kent, Montgomery and Washington Counties, and the incorporated areas of Ocean City, Laurel, Federalsburg, Rockville, Port Deposit, Baltimore City and Gaithersburg. Ocean City and Prince George's County have been extended regular coverage. These areas are shown in Figure 1, on the next page.

Whether land use controls apply to existing structures is determined by the laws of the community in which the property is located. From a Federal atandpoint, however, such controls must apply to all new construction or substantial improvement of properties located in the special flood hazard area begun after the date the flood hazard area is identified by the Administrator. The land use and control measures must be applied equally at least to all known special flood areas within its jurisdiction. Land use measures that do not fully meet the standards prescribed in the regulations may be adopted if exceptional conditions exist that make adherence to such standards premature or uneconomic. The nature, extent of, and reasons for any variances from regulatory standards should be explained in writing and supporting economic, topographic, hydrologic, and other technical data submitted with the copy of the land use measures sent to the Administrator.

The procedure by which the FIA processes applications for flood insurance is summarized as follows: The FIA receives an application from an incorporated city, county or town and it is reviewed to see if the applicant is eligible. Eligibility requirements including suggested resolutions are discussed in Appendix A, "Prerequisites for the Sale of Flood Insurance". If the requirements are met, emergency coverage may be provided without regard to estimated risk premium rates


GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
HARFORD
CECIL
BALTIMORE
BALTIMORE CITY
KENT
QUEEN ANNE'S
MONTGOMERY
HOWARD
ANNE ARUNDEL
ROCKVILLE
TALBOT
CAROLINE
CALVERT
CHARLES
DORCHESTER
WICOMICO
ST. MARY'S
WORCESTER
SOMERSET
OCEAN CITY
Fig. 1
AREAS
ELIGIBLE FOR FEDERAL
FLOOD INSURANCE
LEGEND
AREAS PROVIDED COVERAGE UNDER EMERGENCY PROGRAM
AREAS PROVIDED COVERAGE UNDER REGULAR PROGRAM
COVERAGE OF UNINCORPORATED AREAS ONLY, UNLESS OTHERWISE INDICATED
MARYLAND DEPARTMENT OF STATE PLANNING

which require detailed studies to establish special hazard areas. As soon as possible, the FIA consults flood-prone area maps prepared by the U. S. Geological Survey and transfers this information onto preliminary "Flood Hazard Boundary Maps". These maps are published and sent to the applicant notifying it that these are general maps to be used for planning purposes in the development and implementation of floodplain area management measures. Detailed studies conducted by the Federal, State and local agencies or private engineering firms are done later showing areas in more detail. No expense for the studies accrues to the community.

The emergency program has been extended from its original deadline of December 31, 1972 to December 31, 1973. The FIA believes this deadline will be extended for another year. However, after the deadline for eligibility under the emergency program has passed, no properties can be newly insured or have policies renewed except those in communities for which actuarial rates are available. Requirements for the regular program are detailed in Sections 1910.2(b) and 1910.3 of revised Part 1909, "General Provisions of the National Flood Insurance Program", 36 Federal Register 18175-86, September 10, 1971. These two Sections are attached as Appendix B.

Actuarial rates under the regular program are established using detailed maps and studies. The detailed maps show five areas of flood hazards. They are (1) areas of special flood hazards, (2) areas of special flood hazards with velocity, (3) areas of moderate flood hazards, (4) areas of minimal flood hazards, and (5) areas of undetermined, but possible flood hazards. The cost of flood insurance varies as to the category in which the insured structure and contents

are located. The greater the hazard, the greater the cost of flood insurance. Zone-rate and elevation-rate tables are used for properties in special flood hazard areas, the construction or substantial improvement of which was started on or after the effective date of identification of the areas as special areas. Rates are directly related to the elevation above or below the first floor. Zone-rate tables are used in all zones not containing a special hazard area. They can also be used in special hazard areas for properties, the construction or substantial improvement of which was started before the effective date of identification of the area as a special hazard area. The "FIA Chargeable Rate Table for Prince George's County, Maryland" is shown in Appendix C.

Assistance in qualifying for flood insurance is available directly from the FIA. In addition, the Governor has appointed the Water Resources Administration of the Department of Natural Resources to assist communities in qualifying for the program in the State of Maryland. Mr. Robert S. Norton, Chief, Surface Water Services, is the State Coordinator.

B. U. S. Army Corps of Engineers

The Corps of Engineers' Floodplain Management Services Program and Flood Control Program make available to Federal, State and local governmental agencies information, guidance and advice on flood hazards which will permit them to proceed with such planning, engineering studies, construction and other actions as may be necessary for wise use of floodplains.

The Floodplain Management Services Program includes floodplain information reports, technical services and guidance, guides, pamphlets, related research and comprehensive flood damage prevention planning.

Floodplain information reports are prepared upon the request of State and local agencies to delineate flood problems. Thirteen of these studies have been completed in the State, two are underway and fourteen are authorized. Most of these studies are in the urban or urbanizing areas of metropolitan Washington, D. C. The completed and underway studies are shown in Figure 2, on the next page. These are also identified in Section IV, Status of Studies and Investigations of Flooding Problems in Maryland. Letters of application for floodplain information studies are shown in Appendix D.

The reports do not include plans for the solutions of flood problems. They are intended to provide a basis for further study and planning on the part of the local government in arriving at solutions to minimize vulnerability flood damages. This involves state or local planning programs to guide development by controlling the use made of the floodplains through regulatory measures such as zoning and building regulations, the construction of flood protection works, or a combination of these two approaches.

It is the responsibility of the State and local government agencies to publicize the information resulting from these studies and to put it to use through planning groups, zoning boards, private citizens, engineering and planning firms, real estate and industrial developers, and others to whom it would be useful. Federal agencies also use the flood information in their respective considerations and decisions.

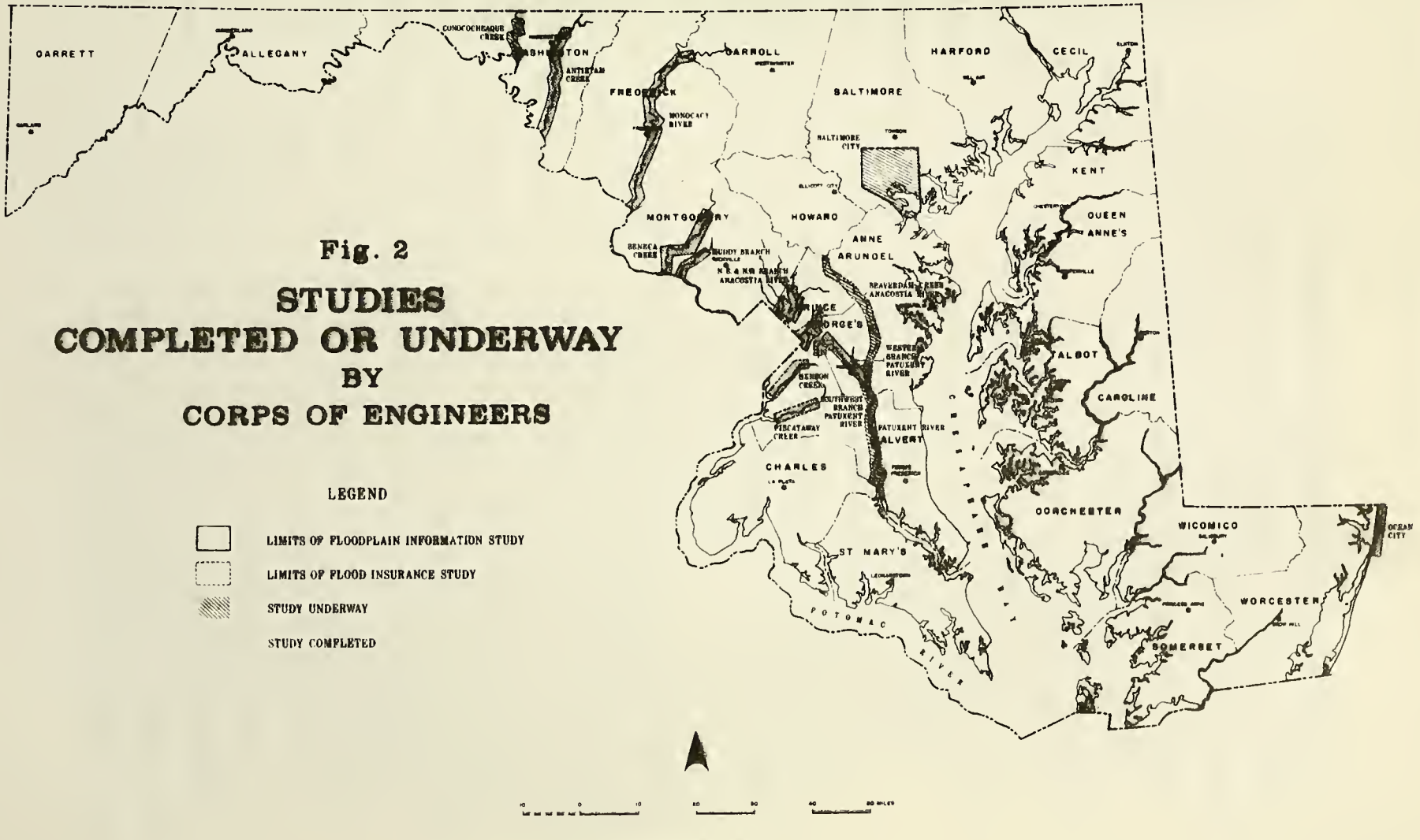


Fig. 2
STUDIES
COMPLETED OR UNDERWAY
BY
CORPS OF ENGINEERS
LEGEND
LIMITS OF FLOODPLAIN INFORMATION STUDY
LIMITS OF FLOOD INSURANCE STUDY
STUDY UNDERWAY
STUDY COMPLETED
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
HARFORD
CECIL
BALTIMORE
BALTIMORE CITY
KENT
QUEEN ANNE'S
MONTGOMERY
HOWARD
ANNE ARUNDEL
PRINCE GEORGE'S
TALBOT
CAROLINE
CHARLES
CALVERT
ST MARY'S
DORCHESTER
WICOMICO
SOMERSET
WORCESTER
OCEAN CITY
CHESAPEAKE BAY
POTOMAC RIVER
PATUXENT RIVER
MONOCACY RIVER
ANTIETAM CREEK
CONOCOCHEAGUE CREEK
BENEDUM CREEK
BUDDY BRANCH
NORTHEAST BRANCH ANACOSTIA RIVER
NORTHWEST BRANCH ANACOSTIA RIVER
WESTERN BRANCH PATUXENT RIVER
SOUTHWEST BRANCH PATUXENT RIVER
BENSON CREEK
PISCATAWAY CREEK
MARYLAND DEPARTMENT OF STATE PLANNING

The floodplain information studies completed by the Corps of Engineers cover two significant phases of floods. They first discuss the largest known floods of the past. Secondly, they consider probable future floods; namely, intermediate regional floods and the standard project floods. Intermediate regional floods are floods that have an average frequency of recurrence in the order of once in a 100-year period; and are determined from an analysis of known floods on the watercourse under study and other streams which have similar physical characteristics and are in the same general geographical regions. Standard project floods are floods of rare occurrence and on most streams, are larger than any floods that have occurred in the past. However, they should be considered in planning the use of the floodplain.

The reports contain maps, profiles and selected cross sections which indicate the extent of flooding which might occur in the future. From the maps, profiles and cross sections, the depth of probable flooding may be learned either by recurrence of the largest known flood or by occurrence of the intermediate regional or standard project floods at any location. With this information, building elevations may be planned high enough to avoid flood damages. If at lower elevations, they can be planned with recognition of the chance and hazard of flooding that are being taken. Although the studies are not requested by the Federal Insurance Administrator, the resulting information has been used as a basis for actuarial studies. To date study areas have been limited to specific watersheds and have not been done

on a jurisdictional basis. This has resulted in a piecemeal approach from the standpoint of detailed flood insurance studies. The Corps of Engineers perform flood insurance studies under contract to FIA.

The Flood Control Program is in response to the 1936 Flood Control Act authorizing the Corps of Engineers to become actively involved, in coordination with State and local entities, in studying and formulating sound solutions to flood problems throughout the Nation. The Flood Control Program of the Corps of Engineers primarily benefits urban areas where most flood damages occur.

Local citizens who desire improvements for flood control have two alternatives in attaining the Corps' assistance. The primary means is by contacting their Congressmen who in turn can take the action necessary to authorize and fund a Federal study. For small, localized flood problems where the cost of the anticipated solution is $1,000,000 or less, the Corps has ongoing authority to undertake a reconnaissance study.

During their flood control studies, the Corps evaluates the economic, engineering, environmental, and social feasibility of a wide range of alternatives. The various solutions considered during a normal study include dams and reservoirs, levees, walls, channel alterations, drainage facilities, flood forecasting and warning, floodplain evaluation, emergency flood fighting and flood proofing. If the study demonstrates the feasibility of a project or program, authorization and funding can then be sought and if they are obtained, the project or program can be accomplished.

Past flood control studies in Maryland have resulted in local flood protection projects at Cumberland in Alleghany County, Kitzmiller in Garrett County, Upper Marlboro, Forest Heights, and along the Anacostia River in Prince George's County and a dam and reservoir flood control project near Bloomington in Alleghany County. Current studies underway in Maryland are the Patuxent River Basin Study and the Nanticoke River and Tributaries Study (Federalsburg). Flood control studies that are authorized but have not been initiated include Beaverdam Creek and Cabin Branch in Prince George's County, and streams draining the Baltimore Metropolitan area.

Public Law 71, Eighty-fourth Congress, requested studies throughout the Nation to determine the feasibility of providing improvements for preventing loss of human lives and damage to property resulting from flood and wave action caused by hurricanes. In response to this, an interim hurricane survey was made by the Corps of Engineers in Maryland.

The study area included the eastern shore of the Chesapeake Bay from the head of the Bay in Maryland to Onancock Creek, Virginia; and the western shore from the head of the Bay to the mouth of the Patuxent River, excluding the Patapsco River Estuary. The study also included all lands along the shorelines and tributaries that are susceptible to flooding by hurricane-induced high tides. The study indicated that the entire shoreline is vulnerable to damages from abnormal tides and wave action from severe storms. Although the hazards to life and property would be substantial, the District and Division Engineers recommended no further planning or investigations for provisions of hurricane protective work at that time (September, 1963). A similar

report was prepared for the Baltimore Metropolitan Area with recommendations that improvements for hurricane tidal protection also not be undertaken.

C. Geological Survey, U. S. Department of Interior

The 89th Congress (1966) in House Document 465 recommended preparation of flood-prone area maps to assist in minimizing flood losses by quickly identifying areas of potential flood hazards. The intent of Congress was to quickly obtain a nationwide "reconnaissance level" of information. A basic premise of the recommendation was that a hydrologist could quickly identify potential flood areas from his assessment of readily available data and from skills obtained through experience.

The Geological Survey (U.S.G.S.) was selected to prepare these maps. Although the greatest confidence cannot be placed in the exact position of the flood boundaries, the maps serve as general warnings of potential flood hazards and as a basis for setting priorities of future detailed studies. Prior to 1969 the maps showed "approximate areas occasionally flooded". In 1969 the project was changed to delineate the approximate boundaries of the 100-year flood. This change was undertaken at the request of the Federal Insurance Administration which was charged with identification of the Nation's floodplains in the August 1968 Flood insurance legislation. As discussed earlier, the FIA has directed that the floodplain inundated by a 100-year flood be used by local governments in developing floodplain management regulations.

House Document 465 also recommended a three-stage program to delineate major flood hazards: (a) listing of towns and streams with flood problems, (b) outlining the floodplain on maps or aerial photographs, and (c) accelerating the present program of flood-hazard information reports. The U.S.G.S. was assigned primary responsibility for item (b). The U. S. Army Corps of Engineers has completed item (a) and is accelerating its program relative to item (c).

The objective of item (b) was to quickly identify areas subject to flooding, without regard to detailed accuracy that will be provided at a much later date under item (c). Areas inundated by a 100-year flood have been outlined on topographic maps.

The scope of the project includes all areas of the United States where flooding from streams, lakes, and tides is a problem. Priority is given to areas listed by the Corps of Engineers under item (a) and to those communities that are interested in participating in the Federal Flood Insurance Program. Those flood-prone areas mapped in the State of Maryland are shown in Figure 3 on the next page.

The Water Resources Division district offices of the U.S.G.S. were encouraged to include coastal areas in their programs. Initially, the mapping of flood-prone areas subject to tidal flooding was left to the National Ocean Survey (formerly the U. S. Coast and Geodetic Survey), and the National Oceanic and Atmospheric Administration. No such mapping has been undertaken at this time.

Preparation for mapping required the U.S.G.S. to assemble all ongoing and completed detailed flood studies to determine

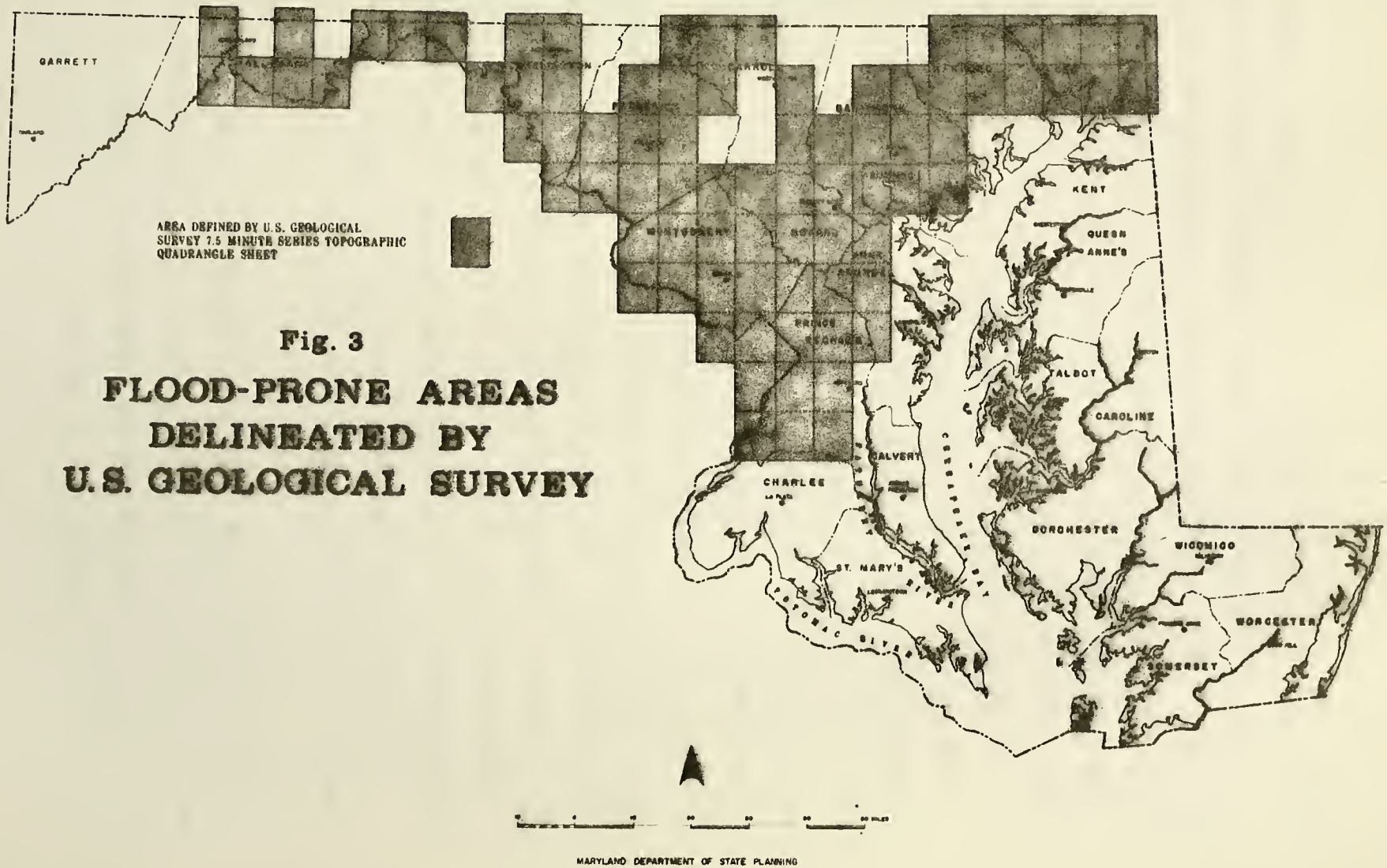



Fig. 3

# FLOOD-PRONE AREAS DELINEATED BY U.S. GEOLOGICAL SURVEY

availability of data that could be useful in mapping. The Corps of Engineers' floodplain information studies were used where available.

Discharge-frequency relationships have been defined for Maryland rivers and streams where there are gaging stations. These were used as follows: the difference between stage of a 100-year flood and stage of median (50% duration) discharge was determined for all natural-flow gaging stations having flood records of adequate length to define a flood-frequency curve. The regional depth-frequency curve was then defined by plotting these 100-year flood heights against an estimated variable, preferably drainage area, or perhaps mean annual flood discharge. To develop adequate accuracy, it was necessary to define separate relationships for local areas, geologic provinces, or other areal groupings.

To delineate flood prone areas by this method, it was necessary to assume that the contours on a topographic map were exact and intersected streams at about the stage of median flow. A median flow profile was then determined and drawn from measurements on the map. For selected sites along this profile, the 100-year flood depth was determined from the regional depth-frequency curve and a flood profile was drawn. Elevations along the 100-year flood profile were then utilized to define the flood boundaries by interpolation on the topographic map.

Profiles of past floods were adjusted to approximate the 100-year profile by adding or subtracting an increment of elevation based on the difference in stage between the past flood and the 100-year flood at a gaging station. For the accuracy requirements of this project it

was usually satisfactory to assume that the recurrence interval of the observed flood was a constant for a considerable length of river reach.

Elevations and locations of high-water marks of past floods provided information for defining flood profiles. Where topographic maps were available, the profile was also transformed into flood boundaries by interpolation between contours. Distance along the stream channel, necessary for defining the profile, was measured upstream from the mouth.

In some instances, profiles were constructed from data extracted from aerial photographs of floods. After adjusting the data to the approximate 100-year flood, the profiles were used to delineate flood boundaries.

D. Soil Conservation Service, U. S. Department of Agriculture

The U. S. Department of Agriculture (USDA) is authorized through the Soil Conservation Act of 1935 (PL-46), the Watershed Protection and Flood Prevention Act of 1954 (PL-566), and the Food and Agriculture Act of 1962 and other authorities to provide technical and financial help to individual and local groups in conserving and developing their natural resources. The USDA also helps those groups planning watershed and resource conservation and development projects seek funds and services from other Federal, state and local sources. The Soil Conservation Service (SCS) has leadership for USDA in the programs of soil and water conservation. One of the principal aims of such programs is to assist plan formulation in carrying out conservation measures for erosion and sediment control, watershed protection and flood prevention.

SCS assistance is mainly through Soil Conservation Districts organized under the 1937 Maryland Soil Conservation Districts Law (Article 166). There are 24 Soil Conaervation Diatricts (SCD's) in Maryland, one for each Maryland County plus the Catoctin District in Western Frederick County. Some conservation projects are of such scope, involving so many communities, and often cutting across District boundaries, that special Watershed Associations or Drainage Districts have also been created.

The technical asaistance, planning and guidance and other help to SCD's is provided by a variety of Federal, State, County and local governmental agencies and organizations. Some of these are the Soil Conservation Service, the Agriculture Stabilization and Conservation Service of the United Statea Department of Agriculture, Corps of Engineers, Extension Service and Agriculture Experimental Station of the University of Maryland, the Maryland Department of Natural Resources, and county governing bodies. State and county school systems, farm organizations, service clubs, garden clubs, and many other private organizations help with the total job of conservation education and the application of conservation on the land.

A State Soil Conservation Committee was established by the Maryland General Assembly in 1937 within the State Board of Agriculture and the Regents of the University of Maryland to coordinate the work of SCD's and to secure cooperation and assistance from federal and state agencies to assist SCD's. The law establishing the committee was amended in the 1971 Session of the Maryland General Assembly to include as follows: "The Secretary of the Department of Natural Resources or

his designated representative, the principle administrative officer for Agriculture Affairs at the University of Maryland or other University official he may designate, the Chairman of the Maryland Agriculture Commission or other member he may designate, the President of the Maryland Association of Soil Conservation Districts, and three soil conservation district supervisors representing different geographic areas of the State of Maryland . . ." A 1972 Act in Maryland recently shifted the State Soil Conservation Committee to the new Maryland Department of Agriculture created by this Act. This Committee is charged by law with the creation of Soil Conservation Districts, coordination of their activities, providing assistance, and informing the general public about their programs.

The State Committee offers all possible and practical assistance to the SCD's in carrying out their local land use and conservation programs. It also assists SCD's in securing the advice and help of State and Federal agencies having resources that can be brought to bear on soil and water problems and on certain phases, related land-use programs and problems. These areas include watershed protection and flood prevention, siltation of streams and reservoirs, shore erosion control, highway erosion control, forest and woodland conservation and development, the protection and development of wildlife and the development of public land areas.

When requested to do so by the District governing board or by the Maryland Department of Agriculture, the Committee also acts to coordinate the activities of Soil Conservation Districts with the programs of local, State and Federal groups concerned with Maryland's land and water problems and resource development. The State Committee

supervises the expenditure of State funds appropriated for use in the Soil Conservation District program.

Through SCD's and in cooperation with the State Conservation Committee, the SCS helps carry out watershed-protection and flood-prevention projects and river basin investigations in cooperation with other agencies as authorized by the Flood Control Act of 1944, PL 534 and PL 566 enacted in 1954. Also through conservation districts, the SCS is helping more and more municipal and county officials, planning bodies, and developers cope with problems of erosion, improper land use, flooding and sedimentation. SCS advises and gives guidelines for controlling erosion on highways, subdivisions, shopping centers, and airports. The Service has surveyed and mapped all (except 20,000 acres to be completed by September, 1973) the soils of the State as part of the National Cooperative Soil Survey Program which they adminster. Below is a chart showing status of soil surveys in Maryland as of July 1, 1973.

| Published Soil Surveys | Surveys Completed and Estimated Publication[1] | | Mapping Completed and Manuscripts Prepared and Estimated Publication | | Incomplete Surveys and Estimated Publication |
|---|---|---|---|---|---|
| Calvert | Cecil | 1973 | Harford 2/ | 1975 | St. Mary's 1976 (survey will be completed 9/73) |
| Caroline | Baltimore 2/ | 1973 | | | |
| Carroll | Charles | 1973 | | | |
| Frederick | Alleghany | 1974 | | | |
| Howard | Garrett | 1974 | | | |
| Kent 3/ | | | | | |
| Montgomery | | | | | |
| Pr. George's | | | | | |
| Queen Anne's | | | | | |
| Somerset | | | | | |
| Talbot | | | | | |
| Washington | | | | | |
| Wicomico | | | | | |
| Anne Arundel | | | | | |
| Worcester | | | | | |

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1/ Fiscal years in which each survey is scheduled to go to the printer. The published survey is available for distribution approximately one year after it goes to the printer. Interim materials preliminary to publication may be viewed in the office of the Soil Conservation Service in the individual counties. However, SCS is not equipped to prepare copies of interim materials for general distribution. Contact the District Conservationist in the county of interest for specific information as needed.

2/ Interim or preliminary reports have been prepared for these counties. Contact the District Conservationist for the Soil Conservation Service in each of these counties for specific information regarding these reports.

3/ Although Kent County is listed as a published soil survey, copies are no longer available for wide distribution. Kent County was published in 1945 as a Physical Land Conditions Report and the text is almost wholly agriculturally related. However, the soil map is detailed and considered to be very useful for making a wide variety of farm and non-farm soil interpretations when used in conjunction with recently prepared interpretative information available at the Kent County Office of the Soil Conservation Service.

The resulting maps provide information on drainage conditions, depth, slope, erosion, parent material and other properties of the soil. Knowing the location of alluvial (stream laid) deposits, can help planners avoid such mistakes as placing homes in floodplains.

The locations of studies and investigations by the Soil Conservation Service excluding soil surveys, are shown in Figure 4 on the next page.

Under the Small Watershed Protection and Flood Prevention Act of 1954 (PL 566), the Federal Government, Soil Conservation Districts, local government units, and other sponsors plan and develop watershed improvements in two broad categories: land treatment and structural work. The land treatment work is carried out on the basis of conservation plans developed by landowners with technical assistance of SCS. This improved land treatment prevents erosion, decreased runoff and improves the value of the area. Structural work, a result of flood control studies under the PL 566 Program involves the construction of dams and retention reservoirs, agricultural water management measures, municipal and industrial water supply, public recreation developments, and fish and wildlife developments. A Small Watershed, as defined in the Watershed Protection and Flood Prevention Act of 1954, is an area of less than 250,000 acres, or about 390 square miles.

All structures must provide either drainage, irrigation or flood prevention benefits greater than their cost. Other purposes may be served if the community or state governments want them added. The State Soil Conservation Committee must study and approve all applications for

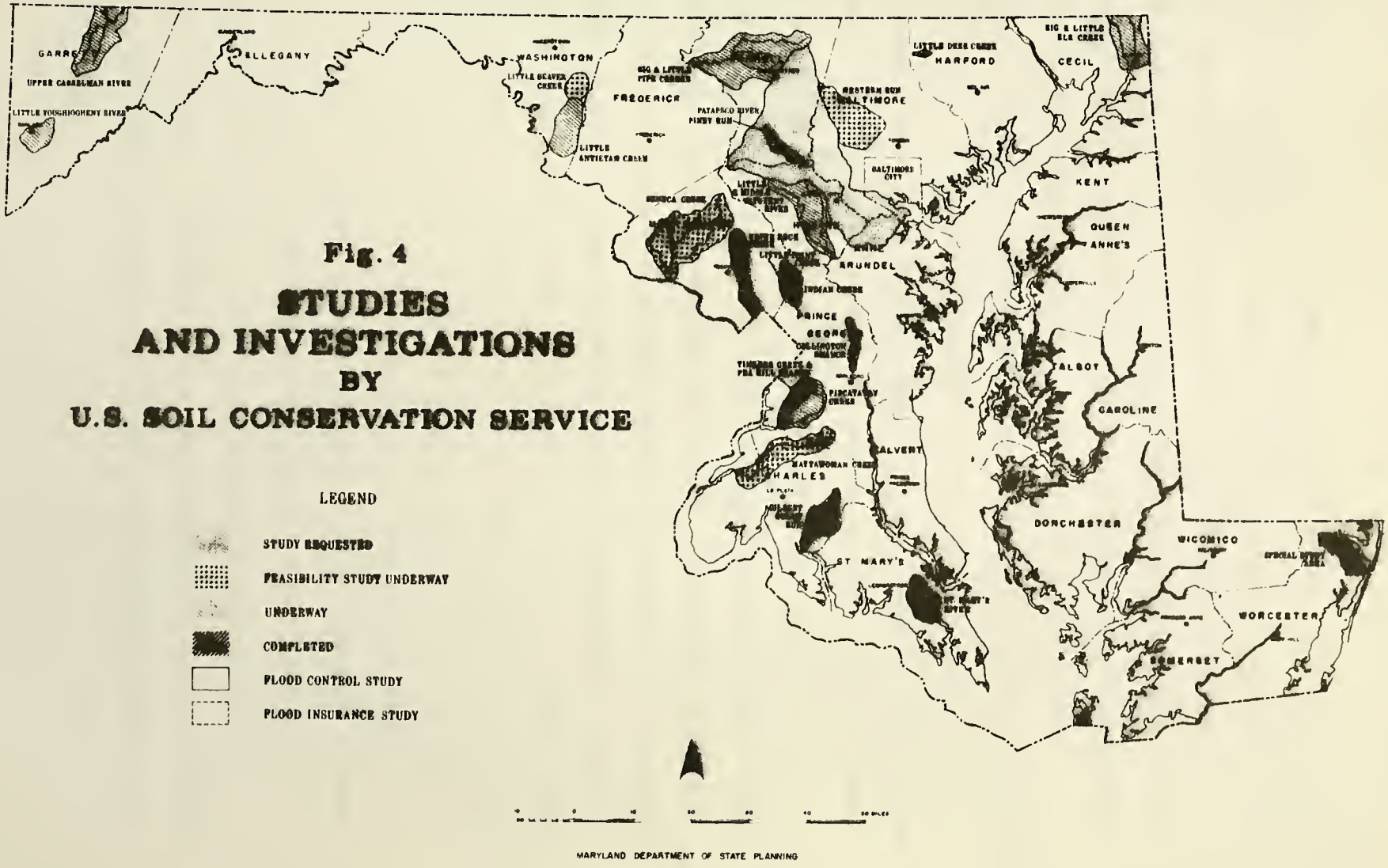



Fig. 4

# STUDIES AND INVESTIGATIONS BY U.S. SOIL CONSERVATION SERVICE

MARYLAND DEPARTMENT OF STATE PLANNING

projects under PL 566. A minimum of one-half of the land above flood-water retarding structures must be under land treatment agreement with the Soil Conservation District before Federal funds for construction can be provided. Since 1954, the State Soil Conservation Committee has approved 41 project applications from the Soil Conservation Districts and other local sponsors, covering over 1 million acres of land. Nineteen of the state's 24 Soil Conservation Districts have been involved as co-sponsors of these applications. Of the 41 project applications, 19 included the building of dams, and 22 were for construction of flood prevention and drainage ditches. One of the 19 dam projects includes a low dam for the recreational enjoyment associated with use of a small fishing lake. Two planned dams have been completed on the upper Rock Creek Watershed in Montgomery Soil Conservation District and many of the individual dams within other projects are finished. In the Little Youghiogheny River Project in the Garrett Soil Conservation District, five of the six planned dams are completed. In the Little Deer Project in the Harford Soil Conservation District, three of four control dams are complete. Also, all of the three planned dams for the Gilbert Run Project in the Charles Soil Conservation District are complete.

The Soil Conservation Service has made flood insurance studies for the Department of Housing and Urban Development. These studies are listed in Section IV, Status of Studies and Investigations of Flooding Problems in Maryland. Only two counties have been studied and only in selected areas. These are Prince George's and Worcester Counties.

E. Maryland State Department of Natural Resources

Two agencies under the Department of Natural Resources (DNR) are involved in flood related studies. They are the Maryland Geological Survey and the Water Resources Administration.

The Maryland Geological Survey is charged with conducting topographic, hydrographic, and geophysical surveys. The Survey's collection, collation, and analysis of geological data is aimed at its application to man's activities with special emphasis on applications to land use. A program is maintained with the U. S. Geological Survey in the area of water resources investigation and data gathering. (Most of the technical work is carried out under the supervision of and largely with the personnel of the U. S. Geological Survey). This cooperative program is responsible for the gathering and analyzing of flow records of Maryland streams. Most of these studies are not directly related to floodplain mapping, but the data developed is vital for computing flood frequencies. The Survey is involved with geologic mapping which includes alluvial (stream laid) deposits. Locations of alluvial deposits provide a measure of floodplains and essentially include the maximum geologic or geomorphic floodplain. In some areas alluvial soils coincide fairly well with the flood-prone areas. Geologic maps are published or are in some stage of preparation in the following areas of the State: Harford, Cecil, and Baltimore Counties, and the Bowie, Towson and Union Bridge U.S.G.S. 7½ minute quadrangle areas.

The Water Resources Administration is responsible for water resource management activities. This includes water quality and water-

shed control enforcement, permits, certification and technical services. Floodplain permits and sediment control programs and plans are part of the prevention oriented activities of watershed control. Surface water management by the administration includes the following: surface water appropriation, permit system for dams and reservoirs, permits for waterway obstructions, and review and advisory services.

Section 50 of Article 96A, Annotated Code of Maryland, provides that the Department of Natural Resources be responsible for and cooperate with the Federal and local governments in developing and carrying out a long-range program for controlling waters in the State and, in addition, to serve in liaison capacity to government agencies in all matters pertaining to flood control. Section 51 of the Code provides that DNR shall provide assistance to local governments and other State agencies in interpreting flood information and in drafting local land use and other regulations pertaining to areas subject to flooding. The law also requires that DNR review plans for local public works and exercise regulatory control over appropriation of State waters, construction of waterway obstructions and associated permits.

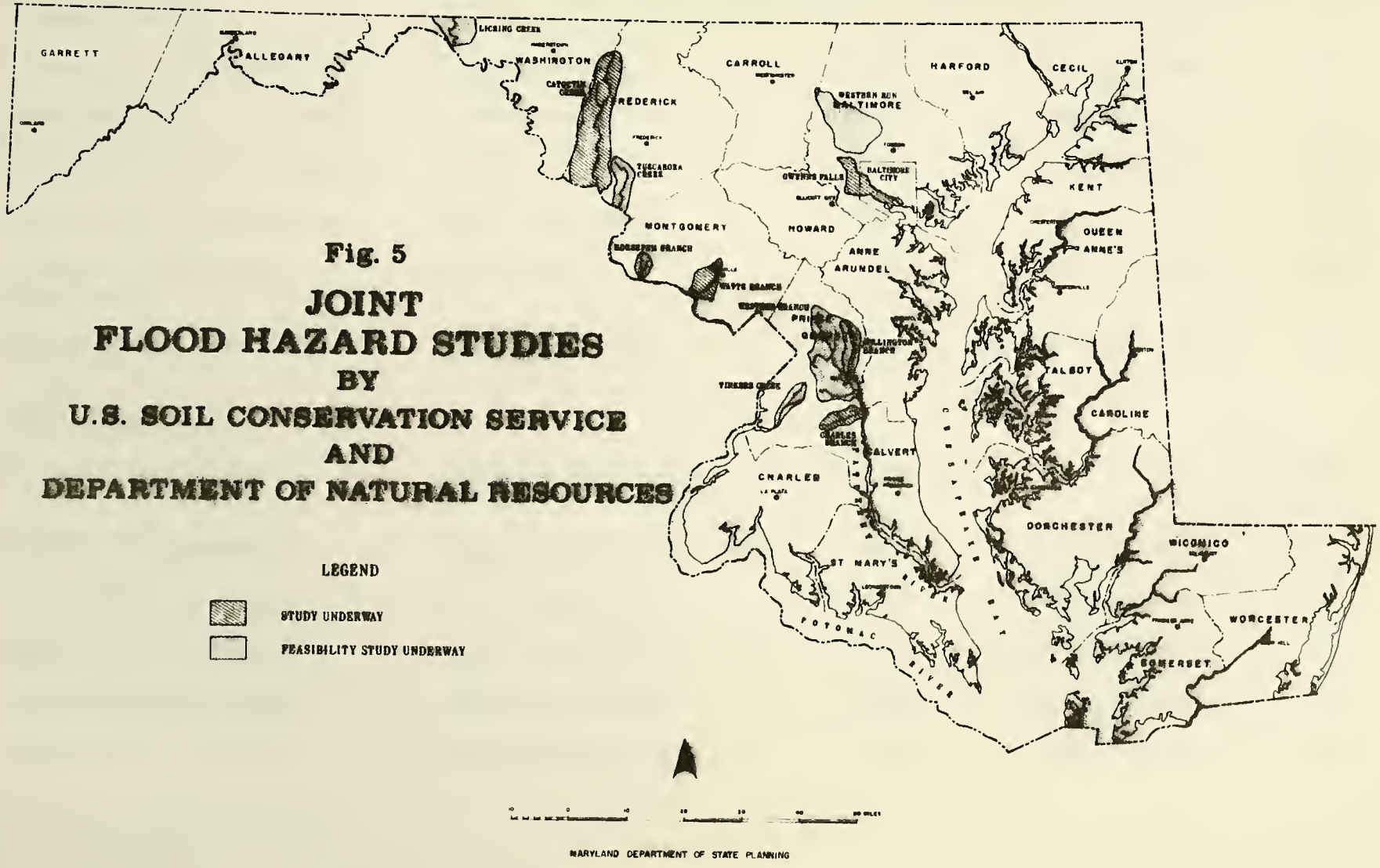
The present program of the Water Resources Administration involves the following: keeping track of the various studies conducted by other agencies which may provide raw data for further study (most of the studies are SCS projects); conducting floodplain studies using inhouse capability in cooperation with the Soil Conservation Service to accelerate action on requests for floodplain information studies; transmit and assign priorities for Corps of Engineers' floodplain information studies and Soil Conservation Service studies; conducting

studies in cooperation with other State and local agencies; acting as State coordinator for the National Flood Insurance Program; and other duties as already discussed concerning Sections 50 and 51 of Article 96A of the Annotated Code of Maryland.

A primary goal of the Water Resources Administration is to develop the capability to model the distribution and circulation of water in developing watersheds and thereby better manage natural and manmade activities. One of the initial steps in achieving this goal was the establishment of a cooperative agreement between DNR and SCS to accelerate the generation of floodplain information. Joint studies resulting from the cooperative program are described as flood hazard studies. The steps taken in these studies are as follows:

1. Study area priorities are established by DNR.
2. SCS contracts for low level aerial photography of study area.
3. SCS selects vertical and horizontal control within the study area.
4. DNR conducts field surveys to establish control.
5. SCS Cartographic Division develops stream cross-section data and topographic detail using stereo-plotters.
6. SCS hydrologists establish runoff characteristics such as time of concentration, watershed geometry and rainfall intensity.
7. DNR establishes the roughness coefficients.
8. DNR locates and measures bridge openings, culvert dimensions, etc.
9. DNR uses computers to calculate water surface profiles and route floods through watersheds.
10. SCS prepares final plan and profile sheets indicating flood levels for specified floods.

The above represents a laborious job of collecting field data. However, once this data is collected the effects of alternate land use and resulting runoff can be used to assess the effectiveness of various flood water retarding structures and closely approximate the areas that may be inundated by flooding. The locations of these joint flood hazard studies are shown in Figure 5 on the next page.


GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
HARFORD
CECIL
BALTIMORE CITY
KENT
QUEEN ANNE'S
MONTGOMERY
HOWARD
ANNE ARUNDEL
TALBOT
CAROLINE
CALVERT
CHARLES
DORCHESTER
WICOMICO
ST MARY'S
WORCESTER
SOMERSET
POTOMAC RIVER
CHESAPEAKE BAY
Fig. 5
JOINT
FLOOD HAZARD STUDIES
BY
U.S. SOIL CONSERVATION SERVICE
AND
DEPARTMENT OF NATURAL RESOURCES
LEGEND
STUDY UNDERWAY
FEASIBILITY STUDY UNDERWAY
MARYLAND DEPARTMENT OF STATE PLANNING

## IV. STATUS OF STUDIES AND INVESTIGATIONS OF FLOODING PROBLEMS IN MARYLAND

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| **ALLEGHANY COUNTY** | | | | |
| Cresaptown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Cumberland 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Flintstone 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Oldtown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Patterson Creek 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Paw Paw 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| **ANNE ARUNDEL COUNTY** | | | | |
| Patuxent River Watershed | Floodplain Delineation for HUD | Corps of Engineers | Underway | 8-73 |
| Bowie 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Laurel 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Odenton 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Relay 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Patapsco River Watershed | Flood Control Study | SCS | Study Requested | N/A |

USGS - U. S. Geological Survey
SCS - U. S. Soil Conservation Service
N/A - Completion date not available at this time

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| BALTIMORE CITY | | | | |
| Jones Falls Watershed | Flood Control Study | Baltimore City | Completed | 6-71 |
| Gwynns Falls Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Herring Run Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Jones Falls Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Maidens Choice Run Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Moores Run Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Patapsco River-Harbor Area Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Western Run Watershed | Flood Insurance Study for HUD | Corps of Engineers | Underway | 8-73 |
| Baltimore, East 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Baltimore, West 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| BALTIMORE COUNTY | | | | |
| Cockeysville 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Ellicott City 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Hereford 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Middle River 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Phoenix 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Reisterstown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Relay 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Towson 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| White Marsh 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Patapsco River Watershed | Flood Control Study | SCS | Study Requested | N/A |
| Western Run Watershed | Flood Control Study | SCS | Feasibility Study Underway | N/A |
| Gwynns Falls Watershed | Flood Hazard Study | SCS & DNR | Underway | 1974 |
| Western Run Watershed | Flood Hazard Study | SCS & DNR | Underway | 1973 |
| Herring Run Watershed, Back River | Floodplain & Storm Drainage Study | DNR | Underway | 1973 |

DNR - Md. State Department of Natural Resources

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| CALVERT COUNTY | | | | |
| Upper Marlboro 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| CARROLL COUNTY | | | | |
| Damascus 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Finksburg 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Littlestown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Sykesville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Taneytown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Union Bridge 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Westminster 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Woodbine 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Woodsboro 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Big and Little Pipe Creek Watershed | Flood Control Study | SCS | Underway | N/A |
| Patapsco River Watershed | Flood Control Study | SCS | Study Requested | N/A |
| Piney Run Watershed | Flood Control Study | SCS | Completed | N/A |
| CECIL COUNTY | | | | |
| Bay View 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Conowingo Dam 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| CECIL COUNTY (CONT'D.) | | | | |
| Elkton 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Havre de Grace 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Newark, W. 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Northeast 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Rising Sun 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Big and Little Elk Creek Watershed | Flood Control Study | SCS | Underway | N/A |
| Lower Reach, Susquehanna River, including Towns of Port Deposit and Perryville | Floodplain Delineation | SRBC | Underway | 10-74 |
| CHARLES COUNTY | | | | |
| Brandywine 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Mount Vernon 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Piscataway 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Gilbert Run | Flood Control Study | SCS | Completed | |
| Mattawoman Watershed | Flood Control Study | SCS | Feasibility Study Underway | N/A |
| FREDERICK COUNTY | | | | |
| Catoctin Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | 1976 |

SRBC - Susquehanna River Basin Commission

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| FREDERICK COUNTY (CONT'D.) | | | | |
| Monocacy River Watershed | Floodplain Information Study | Corps of Engineers | Completed | N/A |
| Potomac River Watershed | Floodplain Information Study | Corps of Engineers | Authorized | 1975 |
| Tuscarora Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Buckeystown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Catoctin Furnace 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Damascus 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Emmittsburg 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Frederick 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Harpers Ferry 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | |
| Middletown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Point of Rocks 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | |
| Union Bridge 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Urbana 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Walkersville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Woodsboro 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Big and Little Pipe Creek Watershed | Flood Control Study | SCS | Underway | N/A |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| FREDERICK COUNTY (CONT'D.) | | | | |
| Little Catoctin Creek Watershed | Flood Hazard Study | SCS & DNR | Underway | 1973 |
| Tuscarora Creek Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| GARRETT COUNTY | | | | |
| Upper Casselman River Watershed | Flood Control Study | SCS | Complete | N/A |
| HARFORD COUNTY | | | | |
| Aberdeen 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Bel Air 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Conowingo Dam 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Delta 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Edgewood 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Fawn Grove 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Havre de Grace 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Jarrettsville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Lower Reach, Susquehanna River including City of Havre de Grace | Floodplain Delineation | SRBC | Underway | 10-74 |
| Little Deer Creek Watershed | Flood Control Study | SCS | Completed | N/A |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| **HOWARD COUNTY** | | | | |
| Clarksville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Damascus 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Ellicott City 7 ½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Savage 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Sykesville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Woodbine 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Little and Middle Patuxent River Watershed | Flood Control Study | SCS | Underway | N/A |
| Patapsco River Watershed | Flood Control Study | SCS | Study Requested | N/A |
| **MONTGOMERY COUNTY** | | | | |
| Muddy Branch Watershed | Floodplain Information Study | Corps of Engineers | Completed | 1973 |
| Little Seneca Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Seneca Creek Watershed | Floodplain Information Study | Corps of Engineers | Completed | 6-67 |
| Watts Branch Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Beltsville 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Damascus 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| MONTGOMERY COUNTY (CONT'D.) | | | | |
| Falls Church 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Gaithersburg 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Germantown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Kensington 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Poolesville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Rockville 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Sandy Spring 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Seneca 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | |
| Sterling 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Urbana 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Washington, West 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Seneca Creek Watershed | Flood Control Study | SCS | Feasibility Study Underway | N/A |
| Upper Rock Creek Watershed | Flood Control Study | SCS | Completed | N/A |
| Watts Branch Watershed | Flood Hazard Study | SCS & DNR | Underway | N/A |
| Horsepen Branch | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| Horsepen Branch | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| PRINCE GEORGE'S COUNTY | | | | |
| Beaverdam Creek Watershed | Floodplain Information Study | Corps of Engineers | Completed | 9-67 |
| Charles Branch Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Collington Branch Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Henson Creek Watershed | Flood Insurance Study for HUD | Corps of Engineers | Completed | N/A |
| Henson Creek Watershed | Floodplain Information Study | Corps of Engineers | Completed | 3-66 |
| Indian Creek Watershed (N.E. Branch, Anacostia River) | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |
| Indian Creek Watershed (N.E. Branch, Anacostia River) | Floodplain Information Study | Corps of Engineers | Authorized | 6-68 |
| Little Paint Branch Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Mattawoman Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| N.E. Branch, Anacostia River Watershed | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |
| N.E. Branch, Anacostia River Watershed | Floodplain Information Study | Corps of Engineers | Completed | 6-68 |
| N.W. Branch, Anacostia River Watershed | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| PRINCE GEORGE'S COUNTY (CONT'D.) | | | | |
| N.W. Branch, Anacostia River Watershed | Floodplain Information Study | Corps of Engineers | Completed | 6-68 |
| Paint Branch Watershed (N.E. Branch, Anacostia River) | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |
| Paint Branch Watershed (N.E. Branch, Anacostia River) | Floodplain Information Study | Corps of Engineers | Completed | 6-68 |
| Patuxent River Watershed | Floodplain Delineation for HUD | Corps of Engineers | Underway | 8-73 |
| Piscataway Creek Watershed | Flood Insurance Study for HUD | Corps of Engineers | Completed | N/A |
| Piscataway Creek Watershed | Floodplain Information Study | Corps of Engineers | Completed | 11-67 |
| Sligo Creek Watershed (N.E. Branch, Anacostia River) | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |
| Sligo Creek Watershed (N.E. Branch, Anacostia River) | Floodplain Information Study | Corps of Engineers | Completed | 6-68 |
| Southwest Branch Watershed (Western Branch, Patuxent River) | Flood Insurance Study for HUD | Corps of Engineers | Authorized | 9-71 |
| Southwest Branch Watershed (Western Branch, Patuxent River) | Floodplain Information Study | Corps of Engineers | Completed | 9-68 |
| Tinkers Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Western Branch, Patuxent River Watershed (Folly, Lottsford and Bald Hill Bg.) | Flood Insurance Study for HUD | Corps of Engineers | Completed | 9-71 |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| PRINCE GEORGE'S COUNTY (CONT'D.) | | | | |
| Western Branch, Patuxent River Watershed (Folly, Lottsford and Bald Hill Bg.) | Floodplain Information Study | Corps of Engineers | Completed | 12-72 |
| Alexandria 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Anacostia 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Beltsville 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Bowie 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Brandywine 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Lanham 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Mount Vernon 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Piscataway 7 ½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Upper Marlboro 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Washington, East 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Collington Branch, Western Branch, River Watershed | Flood Insurance Study For HUD | SCS | Completed | 6-71 |
| Indian Creek, Anacostia River Watershed | Flood Insurance Study for HUD | SCS | Completed | N/A |
| Little Paint Branch, Anacostia River Watershed | Flood Insurance Study for HUD | SCS | Completed | 6-71 |
| Mattawoman Creek (including Charles County) Watershed | Flood Control Study | SCS | Feasibility Study Underway | N/A |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| PRINCE GEORGE'S COUNTY (CONT'D.) | | | | |
| Piscataway Creek Watershed | Flood Control Study | SCS | Underway | N/A |
| Tinkers Creek and Pea Hill Branch Watershed | Flood Insurance Study for HUD | SCS | Completed | 6-71 |
| Charles Branch Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| Collington Branch Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| Tinkers Creek Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| Western Branch Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |
| ST. MARY'S COUNTY | | | | |
| Gilbert Run Watershed | Flood Control Study | SCS | Completed | N/A |
| St. Mary's River Watershed | Flood Control Study | SCS | Completed | N/A |
| WASHINGTON COUNTY | | | | |
| Antietam Creek Watershed | Floodplain Information Study | Corps of Engineers | Completed | N/A |
| Conococheague Creek Watershed | Floodplain Information Study | Corps of Engineers | Underway | 1974 |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| WASHINGTON COUNTY (CONT'D.) | | | | |
| Licking Creek Watershed | Floodplain Information Study | Corps of Engineers | Authorized | Indefinite |
| Potomac River Watershed | Floodplain Information Study | Corps of Engineers | Authorized | 1974 |
| Bellegrove 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Cherry Run 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Funkstown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Hagerstown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Hancock 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | |
| Hedgeville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Keedysville 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Mason-Dixon 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 9-73 |
| Shepherdstown 7½ min. quadrangle | Flood Prone Areas | USGS | Being Printed | 7-73 |
| Williamsport 7½ min. quadrangle | Flood Prone Areas | USGS | Completed | N/A |
| Little Antietam Creek Watershed | Flood Control Study | SCS | Underway | N/A |
| Licking Creek Watershed | Flood Hazard Study | SCS & DNR | Feasibility Study Underway | N/A |

| STUDY AREA | TYPE OF STUDY | AGENCY | STATUS | COMPLETION DATE |
|---|---|---|---|---|
| WORCESTER COUNTY | | | | |
| Ocean City Watershed | Flood Insurance Study for HUD | Corps of Engineers | Completed | 6-71 |
| Unincorporated Area Watershed | Flood Insurance Study for HUD | SCS | Completed | N/A |

REVISED: 9-26-72

## PREREQUISITES FOR THE SALE OF FLOOD INSURANCE

I. In order to qualify for Federal flood insurance a community must apply for eligibility for the entire area within its jurisdiction, and must submit:

(a) A copy of the land use and control measures the community has adopted in order to meet the requirements of Section 1910.3(a) and/or Section 1910.4(a) of our regulations (see enclosed sample resolution Part B). This submission should include copies of those sections of existing codes, ordinances and/or regulations specifically related to the reduction or prevention of flood or mudslide damage. If national codes (BOCA, SSBC, UBC etc.) have been adopted locally to meet any of these requirements, copies of the measures adopting these codes and any variances from them should be submitted and not the codes themselves.

(b) A large-scale map of the entire area under the community's jurisdiction, identifying local flood plain areas and mudslide areas, if any, and showing the names of rivers, bays, gulfs, lakes, and similar bodies of water that cause floods. This may be an informal freehand delineation.

(c) A brief summary of the community's history of flooding and/or mudslides and the characteristics of its flood plain and/or mudslide areas, <u>if available</u>, including the locations of any known high water marks and/or mudslide occurences.

A current flood plain information report prepared by a public or private agency may satisfy this requirement if already available.

(d) A clean map of the community, preferably in black and white, clearly delineating its corporate limits, which can be reproduced for publication. If the best available map is copyrighted, a letter of release must be obtained and submitted.

(e) A list of the incorporated communities within the applicant's boundaries if the application is made on behalf of a county or a political subdivision containing more than one incorporated community.

(f) Estimates relating to the floodprone area concerning:

(i) Population,

(ii) Number of one to four family residences,

(iii) Number of small business structures,

(iv) Number of other structures,

(g) Address of a local repository, such as a municipal building, where the flood insurance and flood hazard maps will be made available for public inspection.

II. ASSURANCES OF FUTURE COMPLIANCE:

Submit resolution containing, at a minimum, the assurances listed below in the form of the enclosed suggested resolution Part A. These are taken from Section 1909.22.

(a) Indicate a local need for flood insurance and an explicit desire to participate in the Federal Flood Insurance Program.

(b) Cite State and local statutes and ordinances authorizing actions regulating land use and copies of the local laws and regulations cited.

(c) Recognize and duly evaluate flood and/or mudslide hazards in all official actions relative to land use in the areas having special flood and/or mudslide hazards and to take such other official action as may be reasonably necessary to carry out the objectives of the program; and

(d) Designate an official, office or agency to:

(1) Delineate or assist the Administrator, at his request, in delineating the limits of the areas having special flood and/or mudslide hazards on available local maps of sufficient scale to identify the location of building sites.

(2) Provide such information as the Administrator may request concerning present uses and occupancy of the flood plain and/or mudslide area.

(3) Maintain for public inspection and furnish upon request, with respect to each area having special flood hazards, information on elevations (in relation to mean sea level) of the lowest floors of all new or substantially improved structures.

(4) Cooperate with Federal, State, and local agencies and private firms which undertake to study, survey, map, and identify flood plain or mudslide areas and cooperate with neighboring communities with respect to management of adjoining flood plain and/or mudslide areas in order to prevent aggravation of existing hazards.

(5) Submit on each anniversary date of the community's initial eligibility, an annual report to the Administrator on the progress made during the past year within the community in the development and implementation of flood plain and/or mudslide area management measures.

(e) Appoint or designate an agency or official with the overall responsibility, authority, and means to implement all the commitments made in the application.

III. A community's application must be submitted to the Federal Insurance Administrator, Department of Housing and Urban Development, 451 Seventh Street, S.W., Washington, D. C. 20410.

PART A

SUGGESTED RESOLUTION TO BE USED WHEN APPLYING FOR FLOOD INSURANCE

WHEREAS, certain areas of the (COMMUNITY) are subject to periodic flooding and/or mudslides from the (STREAM(s)) (ATLANTIC OCEAN) causing serious damages to residential properties within these areas; and

WHEREAS, relief is available in the form of flood insurance as authorized by the National Flood Insurance Act of 1968 as amended; and

WHEREAS, it is the intent of this (BOARD, LEGISLATURE, COUNCIL, ETC.) to comply with land use and management criteria regulations as required in said act; and

WHEREAS, it is also the intent of this (BOARD, LEGISLATURE, COUNCIL, ETC.) to recognize and duly evaluate flood and/or mudslide hazards in all official actions relating to land use in the flood plain and/or mudslide areas having special flood and/or mudslide hazards; and

WHEREAS, the Code Citation(s) of any State enabling legislation and of any resulting county, city, town or village ordinance that authorizes this (COUNTY, CITY, TOWN, VILLAGE) to adopt land use and control measures (is, are), (e.g. STATE LAW, §4; COUNTY LAW, §11; CITY LAW, §20; TOWN LAW, §175; VILLAGE LAW §261);

NOW, THERFORE, BE IT RESOLVED, that this (BOARD, LEGISLATURE, COUNCIL, ETC.) hereby assures the Federal Insurance Administration that it takes the following legislative action:

(1) Appoints (official, office or agency) with the responsibility, authority, and means to:

(a) Delineate or assist the Administrator, at his request, in delineating the limits of the areas having special flood and/or mudslide hazards on available local maps of sufficient scale to identify the location of building sites.

(b) Provide such information as the Administrator may request concerning present uses and occupancy of the flood plain and/or mudslide area.

(c) Maintain for public inspection and furnishing upon request, with respect to each area having special flood hazards, information on elevations (in relation to mean sea level) of the lowest floors of all new or substantially improved structures; and

(d) Cooperate with Federal, State, and local agencies and private firms which undertake to study, survey, map, and identify flood plain or mudslide areas, and cooperate with neighboring communities with respect to management of adjoining flood plain and/or mudslide areas in order to prevent aggravation of existing hazards.

(e) Submit on the anniversary date of the community s initial eligibility, an annual report to the Administrator on the progress made during the past year within the community in the development and implementation of flood plain and/or mudslide area management measures.

(2) Take such other official action as may be reasonably necessary to carry out the objectives of the program.

BE IT FURTHER RESOLVED, that this (BOARD, LEGISLATURE, COUNCIL, ETC.) hereby appoints (AGENCY or OFFICIAL) with the overall responsibility, authority and means to implement all commitments made herein.

PART B

A SAMPLE RESOLUTION TO BE USED WHEN APPLYING FOR ELIGIBILITY TO THE SALE OF FLOOD INSURANCE UNDER THE NATIONAL FLOOD INSURANCE PROGRAM.

IT IS INTENDED TO INDICATE THE BUILDING PERMIT SYSTEM AND THE REVIEW PROCEDURE FOR THAT SYSTEM THE COMMUNITY OR COUNTY HAS ADOPTED.

WHEREAS, The (County, City, Town, etc.) had adopted and is enforcing the ( ) (Building Code, Zoning Ordinance) and

WHEREAS, Section of the ( ) as adopted by ( Name of County or Community) prohibits any person, firm or corporation from erecting, constructing, enlarging, altering, repairing improving, moving or demolishing any building or structure without first obtaining a separate building permit for each building or structure from the (Title of Official), and

WHEREAS, The (Title of Official, Office or Agency) must examine all plans and specifications for the proposed construction when application is made to him for a building permit, and

NOW, THEREFORE, BE IT RESOLVED by the (Name of Local Legislative Body) of (Name of County or Community) as follows:

1. That the (Title of Official) for (Name of County or Community) when reviewing applications for building permits, including the plans and specifications for the proposed construction, will review all building permit applications to determine if the proposed construction is consistent with the need to minimize flood damage.

2. That the (Title of Official, Office or Agency) shall review all building permit applications to determine if the site of the proposed construction is reasonally safe from flooding and to make recommendations for construction in all locations which have flood hazards.

3. That the ( Title of Official, Office or Agency) in reviewing all applications for construction in flood hazard locations within the (County or Community) shall require that any such proposed construction must:

a. Be designed and anchored to prevent the flotation, collapse or lateral movement of the structure or portions of the structure due to flooding.

b. Use of construction materials and utility equipment that are resistant to flood damage.

c. Use of construction methods and practices that will minimize flood damage.

d. Provide adequate drainage in order to reduce exposure to flood hazards.

e. Locate public utilities and facilities on the site in such a manner as to be elevated and constructed to minimize or eliminate flood damage, such utilities and facilities including sewer, gas, electrical and water systems.

4. It is further resolved that the ( Name of Official Office or Agency) in reviewing all subdivision applications shall make findings of fact and determine if:

a. All such proposed developments are consistent with the need to minimize flood damage.

b. Adequate drainage is provided so as to reduce exposure to flood hazards.

c. Adequate drainage is provided so as not to increase the exposure to flood hazards of adjacent lands.

d. All public utilities and facilities are located, elevated and constructed so as to minimize or eliminate flood damage, these utilities and facilities to include sewer gas, electrical and water systems.

**§ 1910.2 Minimum compliance with land management criteria.**

(a) A flood-prone community which becomes eligible for sale of flood insurance prior to December 31, 1971, must have land use and control measures in effect by that date which at least meet the requirements of § 1910.3(a) in order to remain eligible after that date. In addition, the community must meet the respective requirements of § 1910.3 (b), (c), (d), or (e) within 6 months from the date it receives the data required for compliance with the applicable paragraph or by December 31, 1971, whichever is later.

(b) A flood-prone community applying for flood insurance eligibility after December 31, 1971, must meet the standards of § 1910.3(a) in order to become eligible. Thereafter, the community will be given a period of 6 months from the date it receives the data set forth in § 1910.3 (b), (c), (d), or (e) in which to meet the requirements of the applicable paragraph.

(c) A mudslide-prone community which becomes eligible for sale of flood insurance prior to December 31, 1971, must have land use and control measures in effect by that date which meet the requirements of § 1910.4(a) to remain eligible after that date. In addition, the community must meet the requirements of § 1910.4(b) within 6 months after the date its mudslide areas having special mudslide hazards are delineated or by December 31, 1971, whichever is later.

(d) A mudslide-prone community applying for flood insurance eligibility after December 31, 1971, must meet the standards of § 1910.4(a) in order to become eligible for such insurance. Thereafter, the community will be given a period of 6 months from the date the mudslide areas having special mudslide hazards are delineated in which to meet the requirements of § 1910.4(b).

(e) Communities identified in Part 1915 of this subchapter as containing both flood plain areas having special flood hazards and mudslide areas having special mudslide hazards must adopt land use and control measures for each type of hazard consistent with the requirements of §§ 1910.3 and 1910.4.

(f) Local flood and mudslide land use and control measures should be submitted to the State coordinating agency designated pursuant to § 1910.25 for its advice and concurrence. The submission to the State should clearly describe proposed enforcement procedures.

(g) The community official responsible for submitting annual reports to the Administrator pursuant to § 1909.22(b)(2) of this subchapter shall also submit copies of each annual report to any State coordinating agency and to other appropriate State and local bodies, and shall inform the Administrator of the agencies to which the annual reports are sent.

**§ 1910.3 Required land use and control measures for flood-prone areas.**

The Administrator generally will provide the data upon which land use and control measures must be based. If the Administrator has not provided sufficient data to furnish a basis for these measures in a particular community, the community may initially use hydrologic and other data obtained from other Federal or State agencies or from consulting services, pending receipt of data from the Administrator. However, when special hazard area designations and water surface elevations have been furnished by the Administrator, they shall apply. In all cases the minimum requirements governing the adequacy of the land use and control measures for flood-prone areas adopted by a particular community depend on the amount of technical data formally provided to the community by the Administrator. Minimum standards for communities are as follows:

(a) When the Administrator has declared an entire community a flood plain area having special flood hazards and has not defined the special flood hazard areas more precisely, has not provided water surface elevation data, and has not provided sufficient data to identify the floodway or coastal high hazard area, the community must—

(1) Require building permits for all proposed construction or other improvements in the community;

(2) Review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a location that has a flood hazard, any proposed new construction or substantial improvement (including prefabricated and mobile homes) must (i) be designed (or modified) and anchored to prevent flotation, collapse, or lateral movement of the structure, (ii) use construction materials and utility equipment that are resistant to flood damage, and (iii) use construction methods and practices that will minimize flood damage;

(3) Review subdivision proposals and other proposed new developments to assure that (i) all such proposals are consistent with the need to minimize flood damage, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located, elevated, and constructed to minimize or eliminate flood damage, and (iii) adequate drainage is provided so as to reduce exposure to flood hazards; and

(4) Require new or replacement water supply systems and/or sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during flooding.

(b) When the Administrator has identified the flood plain area having special flood hazards, but has produced neither water surface elevation data nor data sufficient to identify the floodway or coastal high hazard area, the minimum land use and control measures adopted by the community for the flood plain must—

(1) Take into account flood plain management programs, if any, already in effect in neighboring areas;

(2) Apply at a minimum to all areas identified by the Administrator as flood plain areas having special flood hazards;

(3) Provide that within the flood plain area having special flood hazards, the laws and ordinances concerning land use and control and other measures designed to reduce flood losses shall take precedence over any conflicting laws, ordinances, or codes;

(4) Require building permits for all proposed construction or other improvements in the flood plain area having special flood hazards;

(5) Review building permit applications for major repairs within the flood plain area having special flood hazards to determine that the proposed repair (i) uses construction materials and utility equipment that are resistant to flood damage, and (ii) uses construction methods and practices that will minimize flood damage;

(6) Review building permit applications for new construction or substantial improvements within the flood plain area having special flood hazards to assure that the proposed construction (including prefabricated and mobile homes) (i) is protected against flood damage, (ii) is designed (or modified) and anchored to prevent flotation, collapse or lateral movement of the structure, (iii) uses construction materials and utility equipment that are resistant to flood damage, and (iv) uses construction methods and practices that will minimize flood damage;

(7) Review subdivision proposals and other proposed new developments to assure that (i) all such proposals are consistent with the need to minimize flood damage, (ii) all public utilities and facilities, such as sewer, gas, electrical, and water systems are located, elevated, and constructed to minimize or eliminate flood damage, and (ii) adequate drainage is provided so as to reduce exposure to flood hazards; and

(8) Require new or replacement water supply systems and/or sanitary sewage systems to be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters, and require on-site waste disposal systems to be located so as to avoid impairment of them or contamination from them during flooding.

(c) When the Administrator has identified the flood plain area having special flood hazards, and has provided water surface elevations for the 100-year flood, but has not provided data sufficient to identify the floodway or coastal high hazard area, the minimum land use and control measures adopted by the community for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of non-residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facili-

ties, to be floodproofed up to the level of the 100-year flood; and

(4) In riverine situations, provide that until a floodway has been designated, no use, including land fill, may be permitted within the flood plain area having special flood hazards unless the applicant for the land use has demonstrated that the proposed use, when combined with all other existing and anticipated uses, will not increase the water surface elevation of the 100-year flood more than 1 foot at any point.

(d) When the Administrator has identified the riverine flood plain area having special flood hazards, has provided water surface elevation data for the 100-year flood, and has provided floodway data, the land use and control measures adopted by the community for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of nonresidential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facilities, to be floodproofed up to the level of the 100-year flood;

(4) Designate a floodway for passage of the water of the 100-year flood. The selection of the floodway shall be based on the principle that the area chosen for the floodway must be designed to carry the waters of the 100-year flood, without increasing the water surface elevation of that flood more than 1 foot at any point;

(5) Provide that existing nonconforming uses in the floodway shall not be expanded but may be modified, altered, or repaired to incorporate floodproofing measures, provided such measures do not raise the level of the 100-year flood; and

(6) Prohibit fill or encroachments within the designated floodway that would impair its ability to carry and discharge the waters resulting from the 100-year flood, except where the effect on flood heights is fully offset by stream improvements.

(e) When the Administrator has identified the coastal flood plain area having special flood hazards, has provided water surface elevation data for the 100-year flood, and has identified the coastal high hazard area, the land use and control measures adopted by the local government for the flood plain must—

(1) Meet the requirements of paragraph (b) of this section;

(2) Require new construction or substantial improvements of residential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood;

(3) Require new construction or substantial improvements of nonresidential structures within the area of special flood hazards to have the lowest floor (including basement) elevated to or above the level of the 100-year flood or, together with attendant utility and sanitary facilities, to be floodproofed up to the level of the 100-year flood;

(4) Provide that existing uses located on land below the elevation of the 100-year flood in the coastal high hazard area shall not be expanded; and

(5) Provide that no land below the level of the 100-year flood in a coastal high hazard area may be developed unless the new construction or substantial improvement (i) is located landward of the reach of the mean high tide, (ii) is elevated on adequately anchored piles or columns to a lowest floor level at or above the 100-year flood level and securely anchored to such piles or columns, and (iii) has no basement and has the space below the lowest floor free of obstructions so that the impact of abnormally high tides or wind-driven water is minimized.

FIA CHARGEABLE RATE TABLE

PRINCE GEORGES CO., MD.*

Effective August 4, 1972

For use with Flood Insurance Rate Map(s) No. I 24 033 0000 10-79

CHARGEABLE FLOOD INSURANCE RATES IN DOLLARS/$100

| RESIDENTIAL | | |
|---|---|---|
| Estimated Actual Cash Value of Dwelling Structure | Structure | Contents |
| 1-family, under $17,501; and all other, under $30,001 | 0.25 | 0.35 |
| 1-family, $17,501 to $35,000; and all other, $30,001 to $60,000 | 0.30 | 0.40 |
| 1-family, over $35,000/and all other, over $60,000 | 0.35 | 0.45 |

| NON-RESIDENTIAL | | |
|---|---|---|
| Estimated Actual Cash Value of Building | Structure | Contents |
| $30,000 and under | 0.40 | 0.75 |
| $30,001 to $60,000 | 0.50 | 0.75 |
| $60,001 and over | 0.60 | 0.75 |

MAXIMUM AMOUNTS OF INSURANCE AT CHARGEABLE RATES

RESIDENTIAL

$17,500 for single unit residential structure
$30,000 for all other residential structure
$5,000 for contents

NON-RESIDENTIAL

$30,000 for Structure
$5,000 for Contents

CONDITIONS UNDER WHICH CHARGEABLE RATES APPLY

Chargeable rates apply to ALL properties not in a special hazard area (flood or mudslide) and to ALL properties in a special hazard area, except those the construction or substantial improvement of which was started after the effective date of identification of the area as a special hazard area.

| Designated Special Hazard Areas | Effective Date of Identification |
|---|---|
| A1-A11 | August 12, 1970 |

*Except Laurel

CONDITIONS UNDER WHICH ACTUARIAL RATES APPLY

Actuarial rates apply to all insurance above the maximum amounts of insurance available at chargeable rates as shown above; and for all properties in special hazard areas for which construction or substantial improvement was started on or after the effective date of identification of the area as a special hazard area.

Elevation-rate tables are always used for properties in special flood hazard areas the construction or substaintial improvement of which was started on or after the effective date of identification of the area as a special hazard area.

Zone-rate tables may be used in all zones not containing a special hazard area. They may be used in special hazard areas for properties the construction or substantial improvement of which was started before the effective date of identification of the area as a special hazard area. In special hazard zones (Symbol contains the letter "A" or "V") when an elevation rate table has been published, the actuarial elevation-rate table, the zone-rate table or chargeable rate table, whichever gives the lower rate for the specific property involved may be used, except those properties in the special hazard zone must use the elevation rate table for the construction or substantial improvement of which was started after the effective date of identification of the area as a special hazard area.

FIA RESIDENTIAL ZONE RATE TABLE

Effective August 4, 1972

PRINCE GEORGES CO., MD.

Actuarial Flood Insurance Rate in Dollars/$100

| Class of Structure and Location of Contents | ZONE (S) A(s) | B | C | D |
|---|---|---|---|---|
| **STRUCTURE** | | | | |
| One Story No Basement | 3.89 | 0.18 | 0.05 | 1.22 |
| Two or More Stories-No Basement | 1.75 | 0.09 | 0.05 | 0.59 |
| Split Level- No Basement | 2.00 | 0.09 | 0.05 | 0.72 |
| One Story w/Basement | 5.00 | 0.65 | 0.10 | 1.62 |
| Two or More Stories-w/Basement | 3.25 | 0.47 | 0.10 | 1.06 |
| Split Level w/Basement | 3.20 | 0.47 | 0.10 | 1.08 |
| Mobile Home-On Foundation | 8.48 | 0.38 | 0.05 | 2.85 |
| **CONTENTS** | | | | |
| All on First Floor | 5.96 | 0.28 | 0.10 | 2.01 |
| All on First Two or More Floors | 2.51 | 0.16 | 0.10 | 1.10 |
| All on First Floor & Basement | 9.20 | 1.54 | 0.20 | 3.17 |
| All on 1st Two Floors & Basement | 4.70 | 0.26 | 0.20 | 1.72 |
| All Above First Floor | 0.19 | 0.10 | 0.10 | 0.10 |
| All in Basement | 38.36 | 8.74 | 0.20 | 10.37 |
| Mobile Home on Foundation | 5.86 | 0.25 | 0.10 | 2.15 |

Map numbers and effective dates of identification of special hazard areas are shown on the chargeable rate table.

TABLE I 05-50

**FIA RESIDENTIAL ELEVATION RATE TABLE** **Effective** August 4, 1972

PRINCE GEORGES CO., MD.

**Residential Actuarial Flood Insurance Rate in Dollars/$100**

**ZONE(S)**

A1-A11

| Class of Structure and Location of Contents | First Floor Level, Feet Above or Below Base Flood (1) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | +5 OR MORE | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 | 5 OR MORE |
| | | Above | | | | | | | Below | | |
| **STRUCTURE** | | | | | | | | | | | |
| One Story No Basement | 0.05 | 0.05 | 0.05 | 0.07 | 0.18 | 0.53 | 2.63 | 3.89 | 5.39 | 6.98 | 8.85 |
| Two or more Stories-No Basement | 0.05 | 0.05 | 0.05 | 0.05 | 0.09 | 0.23 | 1.10 | 1.75 | 2.57 | 3.47 | 4.57 |
| Split Level-No Basement | 0.05 | 0.05 | 0.05 | 0.05 | 0.09 | 0.25 | 1.16 | 2.00 | 3.02 | 4.13 | 5.44 |
| One Story w/Basement | 0.10 | 0.10 | 0.10 | 0.14 | 0.65 | 2.42 | 3.47 | 5.00 | 7.22 | 9.76 | 14.57 |
| Two or more Stories-w/Basement | 0.10 | 0.10 | 0.10 | 0.11 | 0.47 | 1.74 | 2.40 | 3.25 | 4.40 | 5.95 | 8.01 |
| Split Level w/Basement | 0.10 | 0.10 | 0.10 | 0.11 | 0.47 | 1.69 | 2.30 | 3.20 | 4.40 | 6.00 | 8.15 |
| Mobile Home On Foundation | 0.05 | 0.05 | 0.05 | 0.09 | 0.38 | 1.17 | 5.44 | 8.48 | 11.86 | 15.22 | 19.06 |
| **CONTENTS** | | | | | | | | | | | |
| All on First Floor | 0.10 | 0.10 | 0.10 | 0.11 | 0.28 | 0.80 | 3.71 | 5.96 | 8.55 | 11.22 | 14.21 |
| All on First Two or More Floors | 0.10 | 0.10 | 0.10 | 0.10 | 0.16 | 0.48 | 1.91 | 2.51 | 3.51 | 4.20 | 8.22 |
| All on First Floor & Basement | 0.20 | 0.20 | 0.20 | 0.30 | 1.54 | 5.21 | 7.00 | 9.20 | 12.15 | 16.00 | 21.05 |
| All on 1st Two Floors & Basement | 0.20 | 0.20 | 0.20 | 0.20 | 0.76 | 2.60 | 3.55 | 4.70 | 6.40 | 8.44 | 11.41 |
| All Above First Floor | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.11 | 0.19 | 0.33 | 0.48 | 0.64 |
| All in Basement | 0.20 | 0.47 | 0.92 | 2.65 | 8.74 | 20.21 | 35.91 | 38.36 | 46.04 | 51.66 | 58.68 |
| Mobile Home On Foundation | 0.10 | 0.10 | 0.10 | 0.10 | 0.25 | 0.75 | 3.33 | 5.86 | 8.74 | 11.79 | 15.00 |

(1) The difference, to the nearest foot, between the first floor elevation and the base flood elevation as indicated on the FIA FLOOD INSURANCE MAP.

Map Numbers and effective dates of identification of special hazard areas are shown on the chargeable rate table.

TABLE V 05-50

Effective August 4, 1972

## FIA NON-RESIDENTIAL ELEVATION RATE TABLE

### PRINCE GEORGES CO., MD.

### ACTUARIAL FLOOD INSURANCE RATE IN DOLLARS/$100

ZONE(S)

A1-A11

| CLASS OF STRUCTURE and LOCATION OF CONTENTS (1) | FIRST FLOOR LEVEL, FEET ABOVE OR BELOW BASE FLOOD (2) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 3 or more Above | 2 Above | 1 Above | 0 | 1 Below | 2 Below | 3 Below | 4 Below | 5 or more Below |
| **STRUCTURE** | | | | | | | | | |
| One Story-No Basement | 0.50 | 0.50 | 0.50 | 0.67 | 2.75 | 4.16 | 5.53 | 7.22 | 8.98 |
| Two or More Stories-No Bsmt. | 0.50 | 0.50 | 0.50 | 0.50 | 1.56 | 1.76 | 2.56 | 3.54 | 4.68 |
| One Story w/Basement | 0.50 | 0.50 | 0.50 | 3.13 | 4.75 | 6.94 | 7.69 | 9.11 | 10.79 |
| Two or More Stories-w/Bsmt. | 0.50 | 0.50 | 0.50 | 2.19 | 3.15 | 4.56 | 5.00 | 6.02 | 7.34 |
| Mobile Home on Foundation | 0.50 | 0.50 | 0.55 | 1.28 | 6.92 | 7.43 | 11.77 | 15.28 | 19.18 |
| **CONTENTS** | | | | | | | | | |
| All on 1st Floor and Above | 1.00 | 1.00 | 1.00 | 1.25 | 1.83 | 3.24 | 5.38 | 8.17 | 12.52 |
| All on 2nd Floor and Above | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Some in Basement | 1.00 | 1.50 | 3.86 | 6.52 | 9.50 | 13.77 | 20.05 | 28.75 | 41.65 |

(1) Location is determined by the lowest floor where any contents are located.
(2) The difference, to the nearest foot, between the first floor elevation and the base flood elevation as indicated on the FIA FLOOD INSURANCE MAP

Map Numbers and effective dates of identification of special hazard areas are shown on the chargeable rate table.

Effective August 4, 1972

FIA NON-RESIDENTIAL ZONE RATE TABLE

PRINCE GEORGES CO., MD.

ACTUARIAL FLOOD INSURANCE RATE IN DOLLARS/$100

| CLASS OF STRUCTURE and LOCATION OF CONTENTS (1) | ZONE(S) A(s) | B | C | D |
|---|---|---|---|---|
| **STRUCTURE** | | | | |
| One Story - No Basement | 4.16 | 0.50 | 0.50 | 4.22 |
| Two or More Stories - No Basement | 1.76 | 0.50 | 0.50 | 1.56 |
| One Story w/Basement | 3.13 | 0.50 | 0.50 | 7.20 |
| Two or more Stories w/Basement | 2.19 | 0.50 | 0.50 | 4.66 |
| Mobile Home on Foundation | 7.43 | 0.55 | 0.50 | 6.92 |
| **CONTENTS** | | | | |
| All on 1st Floor and Above | 3.24 | 1.00 | 1.00 | 1.83 |
| All on 2nd Floor and Above | 1.00 | 1.00 | 1.00 | 1.10 |
| Some in Basement | 6.52 | 3.86 | 1.00 | 9.50 |

(1) Location is determined by the lowest floor where any contents are located.

Map Numbers and effective dates of identification of special hazard areas are shown on the chargeable rate table.

APPENDIX D

## Letters of Application to the U. S. Army Corps of Engineers for Floodplain Information Studies

I. Letter of Application. The application of the local governmental agency should be a letter addressed to the District Engineer, prepared with his assistance if necessary, signed by an authorized officer of the sponsoring local agency, and containing the following and any other relevant information, either in the letter or in an enclosure. Applications for PL. 86-645 studies in Maryland must be submitted to H.M. Sachs, Director of the Water Resources Administration, the Governor's representative for coordinating all such studies in the State. Upon approval of the Water Resources Administration, the application will be forwarded to the District Engineer, Corps of Engineers.

II. Content of Letter.

A. Authority of Local Governmental Agency. The authority, law, charter, or resolution clearly establishing the local agency by the State or subdivision thereof, its interests and jurisdiction in floodplain regulation and planning, and its relation to other local agencies having responsibility therefore, should be cited or attached.

1. Necessity for a Responsible Local Governmental Agency. The existence or possible establishment of responsible local agencies to request or sponsor floodplain information studies is considered of great importance. Such agencies should have authority to cooperate with the Corps of Engineers on this matter and to disseminate and explain the information compiled and provided in floodplain information reports.

B. Desired Objectives of Study.

1. General Objectives

a. To compile in a useful form and disseminate to State and local governmental agencies, information on floods and potential flood hazards, including identification of areas subject to inundation by floods of various magnitudes and frequencies.

b. To encourage optimum use of the Nation's river valleys by providing to State and local governmental agencies a factual basis for:

(1) Reducing future flood damage and hazards through carefully considered and well-planned local regulations and use of floodplains;

(2) Planning such advance protection as may be economically justified for prospective land uses that could not be undertaken without protection; and

(3) Preserving adequate floodway and channel rights-of-way and channel clearances.

c. To provide publicly available information for the guidance of private citizens and interests on use of the floodplains.

d. To reduce future expenditures for Federal projects to protect developments which, in the absence of the program, would have taken place, or for alleviation of

flood problems arising from improper floodplain development.

2. Local Objectives. Specific local objectives prompting the application for a Federal study under Section 206, PL. 86-645.

C. Scope and Limits of Study. The geographic area to be studied should be described, together with the nature of present use and any contemplated community or other plans for floodplain development. The time available before local planning decisions must be made should be stated. The type and extent of local data, mapping, planning, etc., that are available and that will be furnished to supplement the studies by the Corps of Engineers, without cost to the United States, should be described. Any local cooperation in gathering data, mapping, or other services that can be provided should be stated.

D. Assurances of Local Cooperation. The letter of application should give assurances that:

1. The applicant will publicize the information report in the community and area concerned, and make copies available for use or inspection by responsible interested parties and individuals.

2. Zoning and other regulatory, development and planning agencies and public information media, will be provided with the floodplain information for their guidance and appropriate action.

3. Survey markers, monuments, etc., established in any Federal surveys undertaken for Section 206 (PL. 86-645) studies, or in regular surveys in the area concerned, will be preserved and safeguarded.

III. Processing of Applications. Letters of application will be reviewed by the District Engineer; if satisfactory, then will be processed through the Division Engineer to the Chief of Engineers for approval, and for an allotment of funds, when available, to initiate the study.

For additional information, refer to:

Corps of Engineers, U.S. Army, Manual EM 1165-2-111, Change 1.

WATER RESOURCE POLICIES AND AUTHORITIES - Floodplain Information Studies. 21 February 1963.

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